NEW ZEALAND
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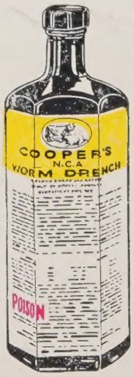

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Volume 84
Number 2
15 February
1952.
(Established 1910)

NEW ZEALAND JOURNAL OF Agriculture

Published by
Direction
of
Hon. K. J. Holyoake,
Minister of Agriculture.

This Month's Cover

Illustrated on this month's cover, which has been reproduced from a colour photograph by Sparrow - Industrial Pictures Ltd., is a special variety of Seville (sour) orange in an Auckland citrus grove. Trees of the variety were imported originally and distributed to growers by an Auckland jam-making firm, as the fruit is very suitable for the making of marmalade. In 1951 the Auckland district produced about 105,000 packed bushel cases of citrus fruits, of which about 74,800 were grapefruit and 28,000 were lemons. Generally soil conditions in the district are not ideal for citrus, but proximity to a large market has enabled growers to establish good-producing groves on the patches of lighter soil by heavy manuring, good management, and attention to drainage.

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The "Journal" is issued monthly. The subscription within New Zealand is 10s. a year; the overseas subscription is 13s. The "Journal" may be ordered from any bookseller or newsagent, or direct from any office of the Department of Agriculture. Individual copies are available from Publications Section, P.O. Box 2298, Wellington, at 1s. a copy, post free.

Subscription inquiries (preferably accompanied by the address cut from a recent "Journal" envelope or wrapper) should be sent to the nearest office of the Department of Agriculture.

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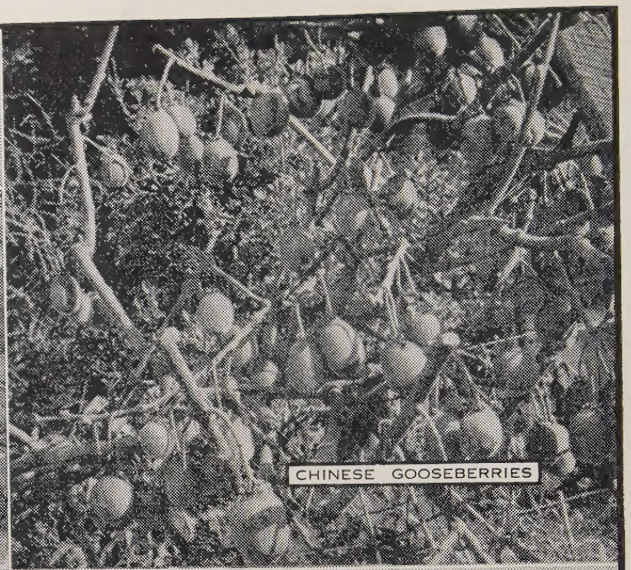
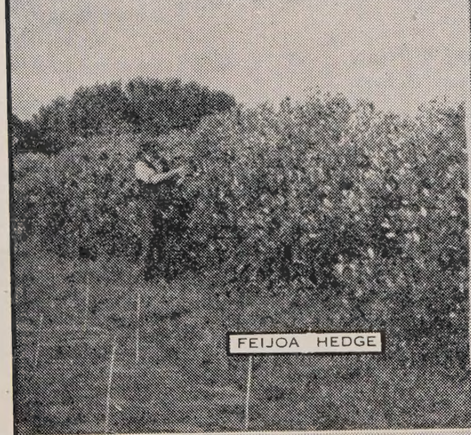
REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE.

GROWING OF SUB-TROPICAL FRUIT

KERIKERI


CHINESE GOOSEBERRIES

Many varieties of sub-tropical fruit trees have been established in New Zealand, but only in recent years have a few of them been grown commercially, being located almost entirely in the more frost-free areas, mainly at Kerikeri, Auckland, Tauranga, and Te Puke. Commercial production is at present confined to tree tomatoes, passion fruit, Chinese gooseberries, and to a limited extent feijoas.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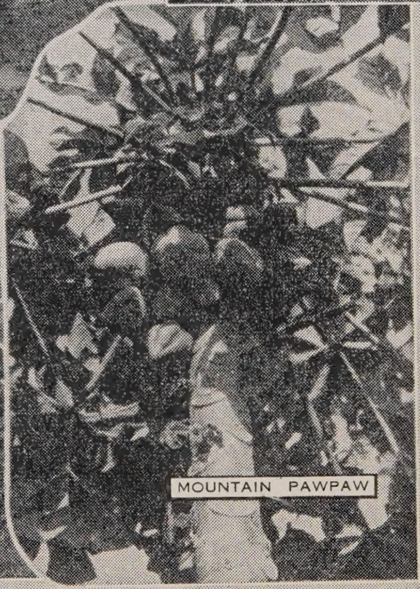

MOUNTAIN PAWPAW

TAURANGA

PICKING TREE TOMATOES

[Photographs by Sparrow Industrial Pictures Ltd., Rendell's Photo Service, National Publicity Studios, and V. C. Browne.

Thal Development Project in Pakistan

DURING recent weeks several steps have been taken to implement the promises made under the Colombo Plan by the Governments of Australia, New Zealand, and Canada to assist the Government of Pakistan in its Thal development project. Last November a young veterinary graduate arrived in New Zealand to undertake a year's study in the technique and organisation af artificial insemination and in various aspects of animal breeding and improvement, and late in January an Australian agricultural officer, who is going to perform the necessary administrative and liaison work between the donor Governments and the Pakistan authorities, visited New Zealand for preliminary discussions with State Departments concerned in the project.

The Thal is a region of semi-desert situated between the Indus and Zhelum Rivers in the State of Punjab in West Pakistan. Few New Zealanders will previously have been aware of its existence other than possibly as a name on one of the pre-partition maps of India. Nevertheless the area is now of considerable importance to this country, because it is the scene of the first major scheme for the development of South-East Asia under the Colombo Plan for Technical Assistance to that area.

The partition of the continent between India and Pakistan has left a legacy of many problems, not the least of which is the settlement in Pakistan of many thousands of refugees. The Government of Pakistan has initiated a project of irrigating a portion of the Thal and settling on small farms as many refugees as possible.

The total area of the region is approximately 6 million acres, but availability of water and topographical factors limit the area which can be irrigated to about 2 million acres. Actually it is hoped to establish 100,000 farms of an average size of 15 acres each, supporting a minimum family of 5 individuals, husband and wife and three children. The people will live in villages as is the custom of the country and it is hoped to establish about 1000 throughout the region. There would thus be half a million people settled on self-supporting farm units and the scheme later envisages a number of industrial towns containing a further quarter of a million people. That, however, lies well in the future and the immediate concern is the settlement of 100,000 farming families. Already a promising beginning has been made and less than a year ago 9653 families had been settled.

The whole project is run by the Thal Development Authority comprised of interested departments of the State of Punjab, and to provide breeding stock of the highest quality to incoming settlers it has been proposed to establish the Thal Livestock Development and Research Farm under the direction of the Animal Husbandry Adviser of the Thal Development Authority.

It is in the establishment of this farm that the Government of Pakistan has requested technical assistance under the Colombo Plan from the Governments of Australia, New Zealand, and Canada.

Nearly a year ago a mission of specialist agricultural officers comprised of three Australians and one New Zealander, the Director of the Extension Division of the Department of Agriculture, visited the area and discussed the proposal with the local authorities. All members of the mission were satisfied that the project was a sound one and recommended to their Governments that it was fully worthy of support.

The area of the farm is approximately 15,000 acres and the uses recommended by the mission were the production by selection, breeding, and feeding of improved types of milking buffaloes and of the local breed of cattle (a draught type of animal), the improvement of the quality and yield of wool of the indigenous breed of sheep, the development of a robust type of donkey as a pack animal, and the development of improved breeds of poultry suitable for the area by using imported breeding stock.

Of the total area of the farm only about half can be served by irrigation. The balance will be used for controlled grazing by sheep and will require fencing, which is virtually unknown in the territory. The mission considers that some 6000 to 7000 acres could ultimately be irrigated, but that the most effective way of achieving this would be by using modern earth-moving equipment, and it suggested that two mechanised units of 750 to 1000 acres be used for the production of green fodder and hay for stock, the balance to be let to tenants for the production of controlled cash crops on a half-share agreement.

Scope of Assistance

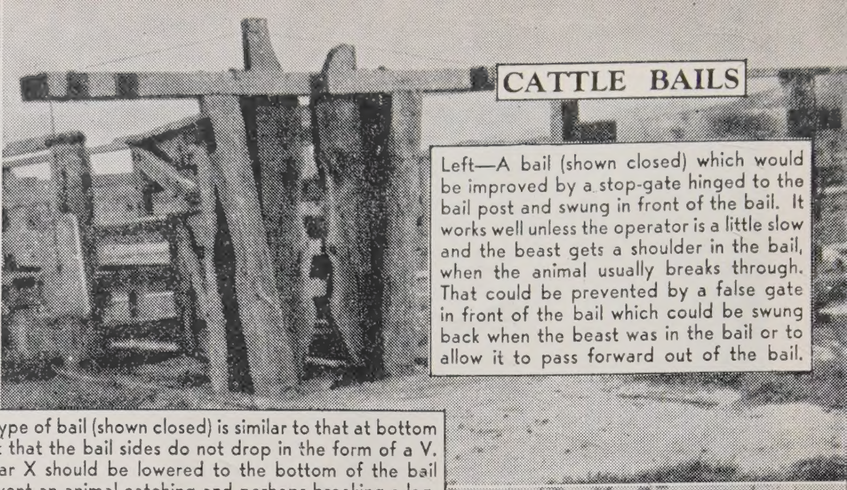
Details of the assistance required from the three donor countries cannot be finalised until the administrative officer who recently visited New Zealand has drawn up, in collaboration with Pakistani officials, a plan of campaign. It is certain, however, that experts will be required in dairy husbandry, crop production, animal breeding, farm mechanisation, and possibly dairy manufacture. New Zealand will probably assist in dairy husbandry and manufacture and animal breeding and to some extent in crop production. Some of the laboratory and other equipment will also be provided by the New Zealand Government.

Other experts and equipment will be provided by the Governments of Australia and Canada, each specialising in those avenues in which it is best adapted to render assistance.

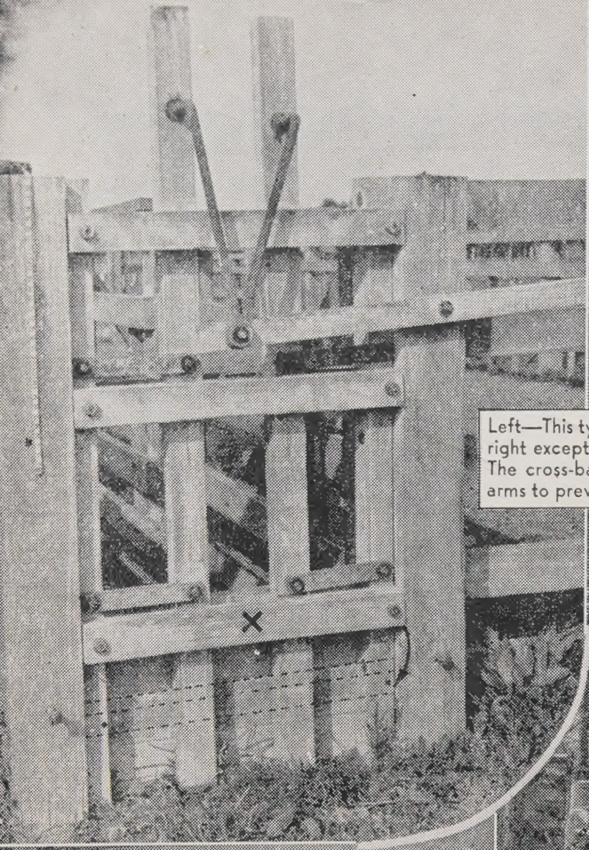
Within a relatively short time the whole project will gather considerable momentum and the Thal Development Farm should present an active example of the type of technical co-operation at present being offered by the Commonwealth countries to the vast under-developed but potentially powerful countries of South-East Asia.

K. J. HOLYOAKE, Minister of Agriculture.

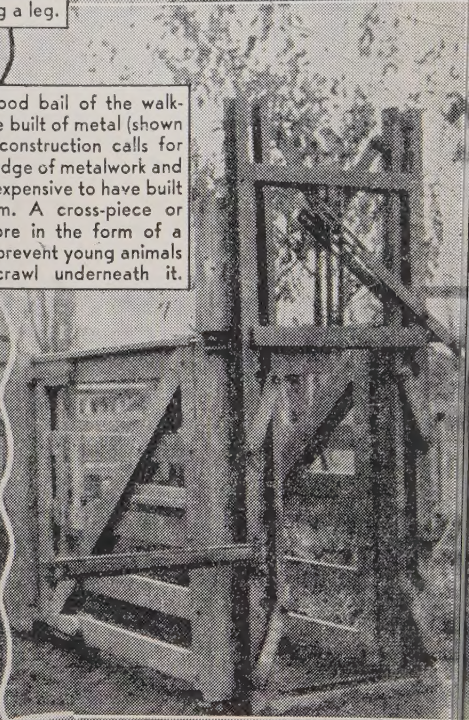
CATTLE BAILS



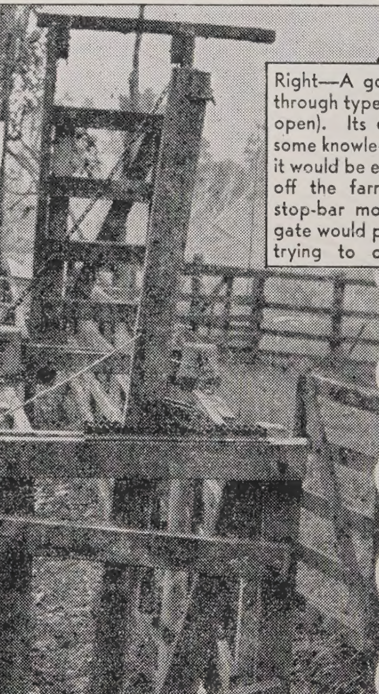
Left—A bail (shown closed) which would be improved by a stop-gate hinged to the bail post and swung in front of the bail. It works well unless the operator is a little slow and the beast gets a shoulder in the bail, when the animal usually breaks through. That could be prevented by a false gate in front of the bail which could be swung back when the beast was in the bail or to allow it to pass forward out of the bail.



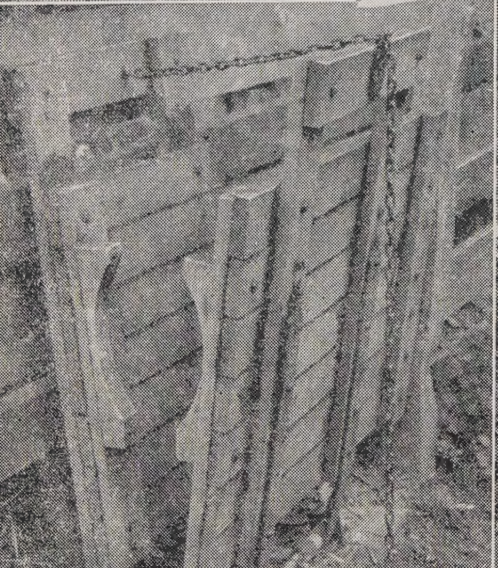
Left—This type of bail (shown closed) is similar to that at bottom right except that the bail sides do not drop in the form of a V. The cross-bar X should be lowered to the bottom of the bail arms to prevent an animal catching and perhaps breaking a leg.



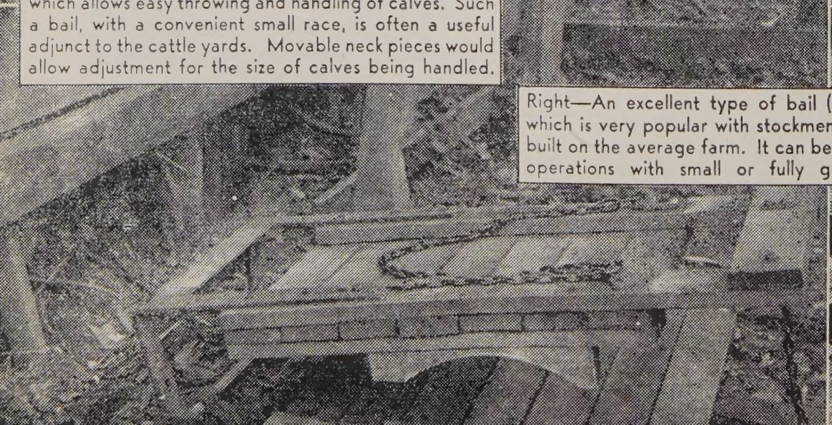
Right—A good bail of the walk-through type built of metal (shown open). Its construction calls for some knowledge of metalwork and it would be expensive to have built off the farm. A cross-piece or stop-bar more in the form of a gate would prevent young animals trying to crawl underneath it.

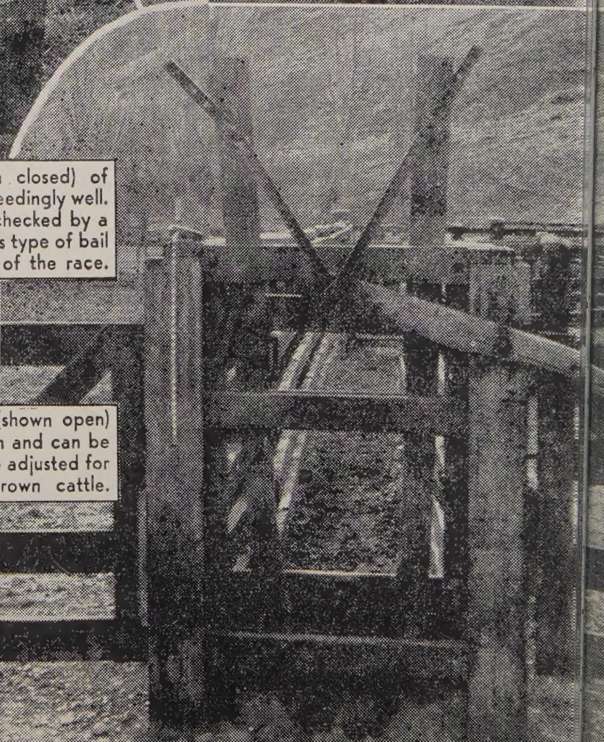


Above—A dehorning bail (shown closed) of simple construction which works exceedingly well. It is operated by a pull chain and checked by a ratchet from an old wool press. This type of bail holds the animal toward one side of the race.



Above and below—A handy type of calf-branding bail which allows easy throwing and handling of calves. Such a bail, with a convenient small race, is often a useful adjunct to the cattle yards. Movable neck pieces would allow adjustment for the size of calves being handled.





Right—An excellent type of bail (shown open) which is very popular with stockmen and can be built on the average farm. It can be adjusted for operations with small or fully grown cattle.

HEADING PHOTOGRAPH: Well-planned cattle yards on a Hawkes Bay property, with long drafting yard and good shelter. Poplars have been put to use, and posts and rails have been kept to the minimum of main yard, crush, and race.

Planning and Construction of CATTLE YARDS

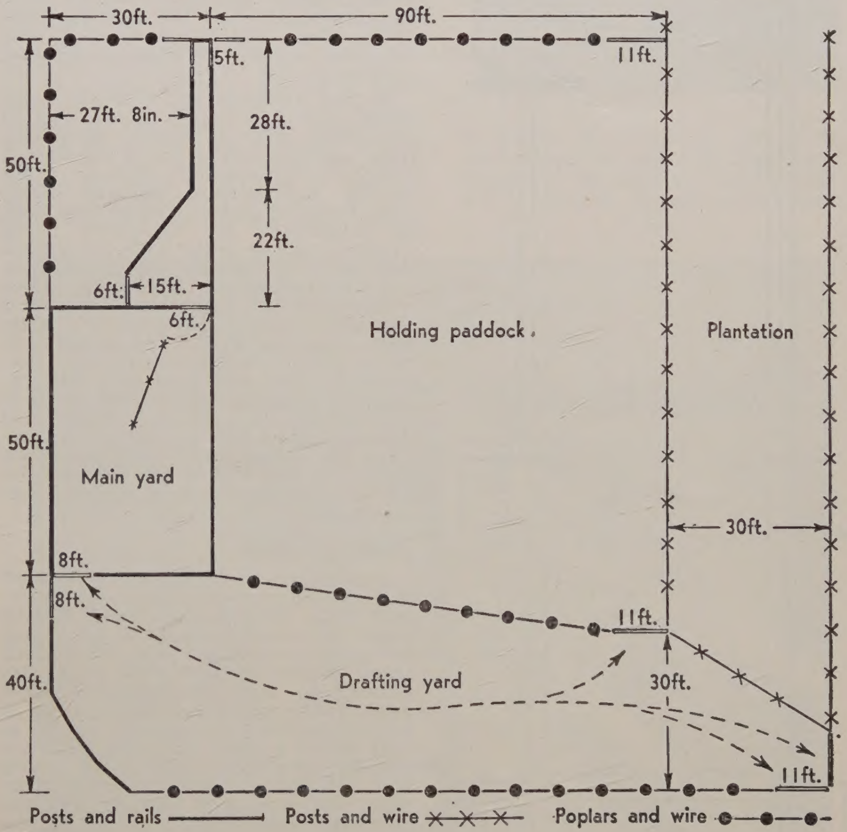
THOUGH the valuable part cattle can play in general farm management is being more widely realised, more attention could be paid on many farms to the provision of facilities enabling the efficient handling of cattle to the best advantage of the economic working of properties. In this article ideas that may assist either established or prospective farmers with the layout and construction of good cattle yards are given by R. G. Montgomery, Sheep and Wool Instructor, Department of Agriculture, Hastings.

PRIMARY considerations in building cattle yards today are materials available and costs. The plan and construction details given have been devised to economise wherever practicable while contributing to over-all utility.

The basic rule for handling cattle is to work them steadily, but the main yard, crush, and race must be able to withstand a very considerable stress of crowded animals. Though economising on the drafting yard and holding paddocks may be good policy, the main yards must be strongly constructed. The crush, race, and bail must be strong enough to prevent any excited beast from damaging either itself or the yard structure.

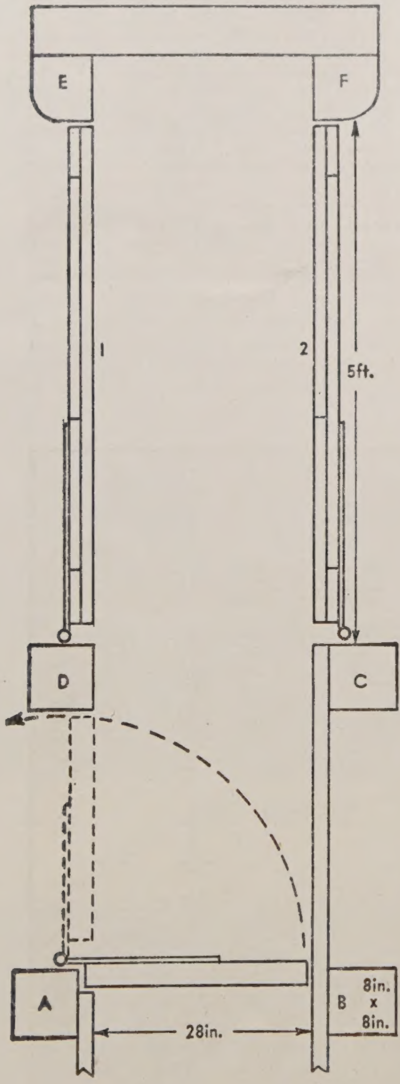
Cattle yards are somewhat similar to sheepyards in that the workability of a yard may be ruined by excessive economy in the construction of the race and adjacent gates—economy that may be justified on outer holding yards, but not at the working centre. A good rule applying to both cattle yards and sheepyards is to plan the desired ultimate layout in full, even if it cannot be built immediately, before digging the first post hole. If capital is limited, it is preferable to make a permanent, finished job of the crush, race, and bail and economise beyond that point. The crush, race, and bail layout is the nucleus of the whole future yard, and false economy should be guarded against when that section is being built.

The site of proposed yards is an obvious early problem, but that will be governed mainly by the need to select a well-drained and sheltered area easily accessible from all parts of the farm. Size must then be decided, and in the plan on this page 18 sq. ft. of holding yard space has been allowed for an average full-grown station cattle beast; that measurement provides a guide to yard capacity and gives the tight pack usual in a saleyard pen. The 18 sq. ft. per beast is for the holding yard only;



The plan of an excellent layout recommended for a property on which 80 to 90 head of cattle would be held in the main yard. The real capacity of a yard is governed by the size and number of outside holding yards or paddocks.

Typical second-class Hawkes Bay hill country improved by decrease of sheep and increase of cattle numbers combined with good management and oversowing with clovers and phosphates. The reduction of sheep stocking resulted in increased wool returns. Eroded slips are healing over.



Race plan showing veterinarian and bail gates.

the long drafting yard would require several times that area, and crush and race would require considerably less. The main yard in the plan has been designed to hold 80 to 90 average station cattle and the mounted men handling them, but the real capacity of the yards will be governed by the size and number of adjacent holding paddocks.

In the building of a main yard, crush, race, and bail it is not easy to economise without either detracting from working efficiency or increasing future maintenance. Where practicable, second-hand railway lines, tram lines, or building stanchions may be substituted for expensive posts. Capping timber posts with galvanised iron as a protection against weather is a wise precaution. Used boiler pipes welded together make an efficient and attractive yard, particularly when aluminium painted. Irrespective of the material used, all yards, and particularly the race and bail section, must be strongly constructed, as it is most unwise to risk any cattle beast discovering its real strength. Railway lines or stanchions used as posts should be 3ft. 6in. in the ground and set in well-rammed, well-graded, binding metal.

Shape of Yard

At first thought the shape of the yard may not appear important, but cattlemen who have had to work station cattle in a badly designed yard may be quite outspoken on that subject. Many otherwise well-built yards are difficult to work because they have been badly planned. Bad yards or faulty handling encourage cattle to mill round a yard, and that tendency can be upsetting to both the beasts and the men trying to force them from one yard into another. In the plan the drafting yard is just off the square, and a post-and-rail wing can be incorporated in the main holding yard to permit steady forcing of the animals into the crush pen.

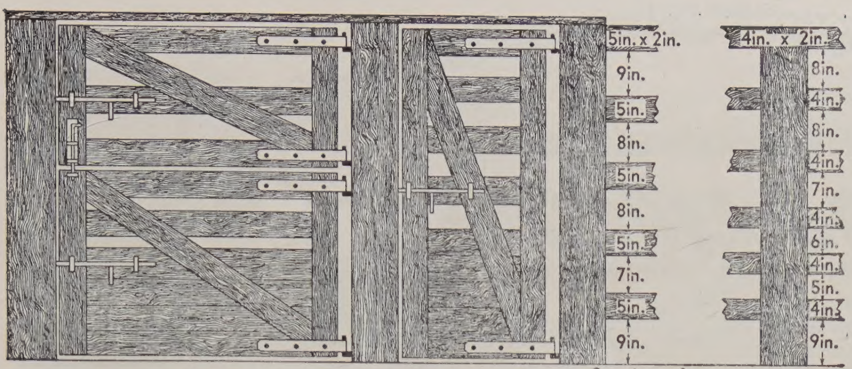
The long tapering drafting yard could be lengthened if much drafting was done, but could hardly be shortened even if the plan were reduced. Drafting races and gates are not recommended for station cattle, as the animals tend to become scared and upset. Steady, unhurried sorting out of the animals in the long drafting yard, while continually talking to them, is usually the quickest and most efficient method of drafting. This work should be done in small lots; if 100 beasts were brought in for drafting, half could be run into the main yard to wait while the other half were drafted.

In the yards shown in the heading illustration 10ft. poplar saplings planted 6 to 8ft. apart make strong posts for a well-battened, 5ft., 10-wire fence. The use of poplars is economic and efficient, the trees providing summer shade while permitting maximum light and drying in winter. Where the growing of poplars is not practicable an ordinary post-and-wire fence can be used for outside yards, strengthened with a steel rope or cable along the top or, if the timber is available, with a cap rail.

Handling of Cattle

The value of a good yard must be governed to some extent by the way in which cattle are handled. They should be handled steadily and drafted in conveniently small lots. During yard work the operators should talk to the animals continually, never moving unexpectedly or taking a beast by surprise. The steadying effect of spoken words is much more efficient than a wildly swung stick or pole. Kindly but firmly is the way in which to treat cattle, never yarding too many at one time and not holding them in a yard longer than is essential.

Use of the holding paddocks spares yards and cattle. Yarded cattle become restless, and it is good policy to empty the yards even at a break in work, such as the dinner hour. Good, well-kept yards are used only as working centres and never as holding pens.



Two-section bail gate

Veterinarian gate

Spacing of race rails

Outside yard rails

Details of a two-section bail gate and a veterinarian gate and of the spacing of race rails and outside yard rails.

Construction of Race

Height, length, and width of the race are important. Main yard and race posts shown in the plan on the opposite page are all 5ft. 6in. high from ground level. About 28ft. from the bail head to the crush end of the race would appear to be a good workable length that allows for crushing 6 or 7 average-sized cattle in the race for incidental work such as inoculation. A short race can cause slow, awkward handling, but excessive length can be dangerous, as too many beasts packing up can exert great pressure on a race and cause considerable trouble and injury. A long race also entails extension of adjacent yards and therefore increased construction costs.

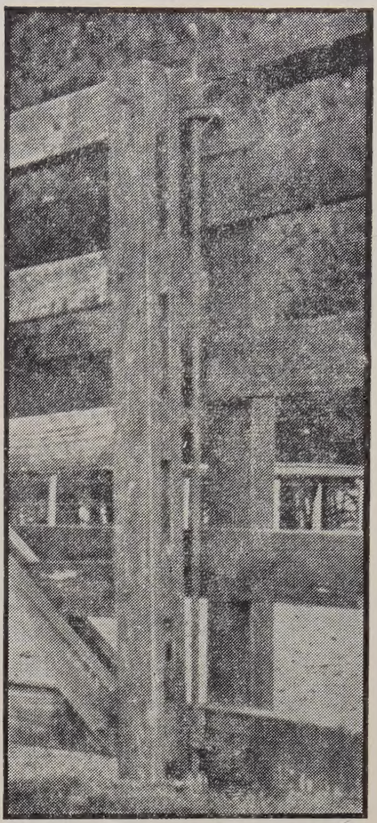
The most satisfactory race width is 28in., though average-sized station cattle can be put through a 24in. race and where only smaller cattle are handled that measurement may suit. In general, the race should be just wide enough to permit efficient working of cattle, yet not wide enough to permit cattle to try to turn and thus jam in the race. A 28in. race would appear most efficient, being narrow enough to prevent turning, yet wide enough to work in and free any beast that goes down.

Good binding metal such as a well-graded clay and shingle mixture is recommended for the race floor. Concrete is not recommended in cattle yards; it can be dangerous and it can be the cause of unnecessary injury to an excited beast. Even where concrete is used for setting posts the crown, particularly on the side in the yard or race, should be kept well below surface level.

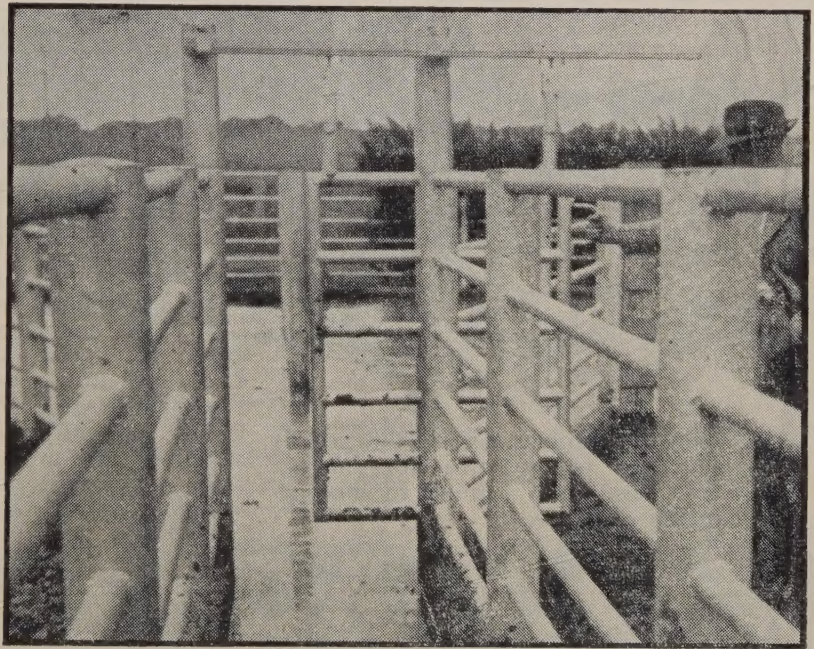
Veterinarian Gate

The gate system shown in the race plan may appear excessive, but is not so in the light of modern needs. The veterinarian gate may be considered essential in a modern cattle yard where such operations as spaying, blood testing for abortion, pregnancy diagnosis, tuberculin testing, temperature taking, faeces testing, and calving troubles are attended to, necessitating an animal being held for skilled attention. The veterinarian gate shown in the plan opens across the race, leaving the operator plenty of working space while giving added protection to anybody working on a beast in the bail. The sense of security given by the gate across the race allows a farmer or veterinary surgeon to concentrate on the beast needing attention instead of trying to work while at the same time being on guard against an uneasy beast behind a set of slip-rails.

The construction and fitting of this veterinarian gate by a farmer are quite simple if the following construction details are followed: The race is built to or from post A on one side and the approximate position of post C on the other side, the bail and bail gates being ignored at this stage. The veterinarian gate is then built and fitted into place, without hinges, across the race between posts A and B. Hinge straps or dogs are then placed in position in or on post A and the hinges placed on the dogs. The hinges are swung around to meet the gate, which must be plumbed in exact position across the race. The use of clamps to hold the hinges to the gate is wise procedure for testing the gate swing.



A method of swinging a gate to a used railway-line post. Eye pieces are welded to the post and a long steel rod is dropped through normal gate hinges.



A section of a yard built of used boiler pipes and including a type of push-in stop-gate.

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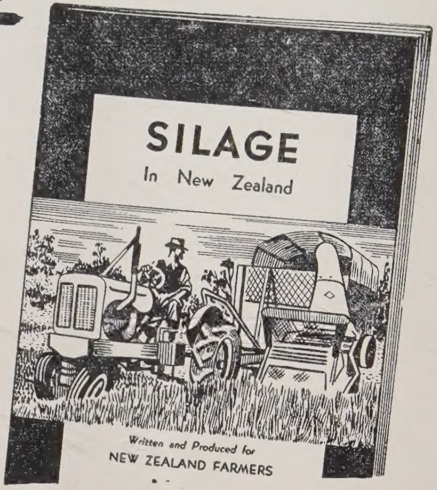

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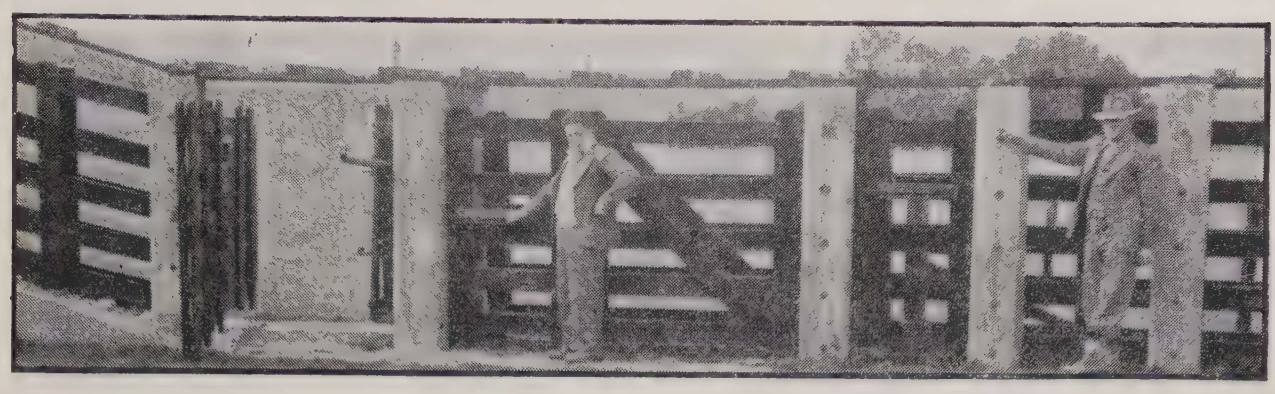


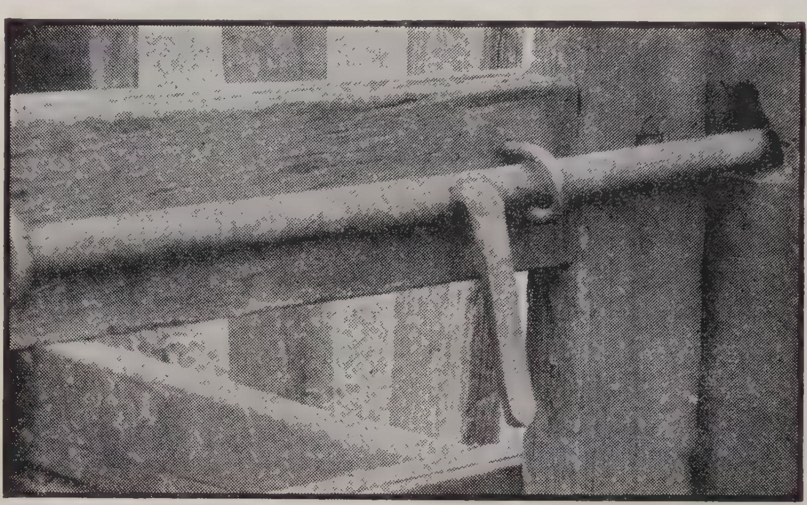
Where a walk-through or hinged bail head is used an extra set of gates can be swung in front of the bail to act as wings for entry to a loading ramp. The extra gates can be opened back out of the way to allow work such as dehorning at the bail head

When the swing has been adjusted bolt holes are marked on the gate, the holes bored, and the hinges bolted to the gate. The veterinarian gate is swung 90 degrees to the open race position—that is, in prolongation of the race side. Positions for posts C and D are then marked and posts set in place. Bail gates are next fitted to posts C and D, and those gates are set in place before the post holes for the bail head are marked out and posts E and F set in position.

Those instructions may appear elementary, but experience has proved their worth and any farmer who is tempted to set posts A, B, C, and D in position before fitting the small veterinarian gate and bail gates as described is likely to meet complications. If the instructions are followed, the fitting of the small gate presents no problems and its successful working will provide one of the most valuable features of the cattle yard.

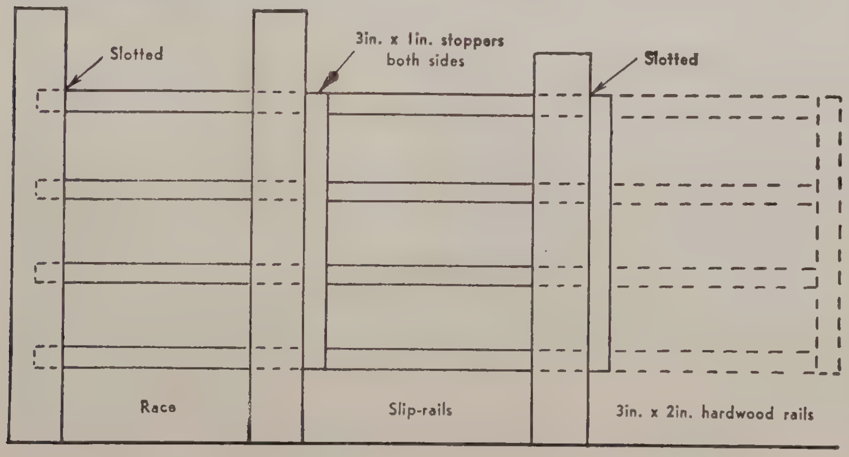
Bail Gates

Bail gate 1 in the race plan is of the stable-door or two-section type; the top and bottom sections can open or close independently. It can be used as a complete gate, the top section alone can be opened to allow working on the top line of the animal for such jobs as branding, or the bottom section alone can be opened to give access to the lower part of the animal for such operations as work on feet or a cow's udder or treatment for a bull.



All gate fasteners should be heavy enough to withstand rugged handling. This bolt is of ¾in. round steel with a welded lug.

Gate 2 is a normal gate in one piece. This gate is sometimes hinged at the bail to allow its use as a drafting gate for running off odd stock or weaners, but that has disadvantages and most cattlemen confine their drafting to quiet handling in the drafting yard.



Details of a slip-rail gate.

Slip-rails

Slip-rail gates of the permanent type shown in the diagram on this page can be useful at the crush end of the race. They allow for quick handling and are always in place ready for use if the cattle stop in the correct position. That is why set or fixed slip-rails are recommended for use only at the end of the race and not for intermediate stops.

Intermediate stops are best provided by bolting two 4in. x 2in. timbers 5in. apart perpendicularly at convenient intervals along the race sides to act as stops for independent rails. Cattle beasts seldom stop twice in exactly the same race position, and independent rails at intervals allow for packing or forcing the beasts up in the race.

Rail Spacing

The spacing of the 5in. x 2in. rails for the race sides is an important consideration. The 9in. space at the top allows arm room for an operator outside the race to work through the rails on beasts packed in the race. Working on packed animals from outside the race can save considerable time and labour on such jobs as inoculations.

Honey House Equipment

EQUIPMENT used in a King Country honey house capable of handling the crop from 800 to 1000 colonies is described in this article by C. R. Paterson, Apiary Instructor, Department of Agriculture, Hamilton. An article in the September 1951 issue of the "Journal" described equipment used by the smaller commercial beekeeper.

THE plant of Mr. E. H. Shoebridge, Manunui, which is capable of handling from 30 to 40 tons of honey, is at present set up in a building not originally intended for a honey house. In the near future Mr. Shoebridge hopes to erect a modern honey house, when the equipment will be rearranged to perhaps better advantage. The general layout then will most likely be with all equipment along one wall and the rest of the space available for packing and storage. The plant includes both a hot and a cool room, one to facilitate extraction and the other to ensure quick granulation of the packed honey.

General Layout

The equipment in this honey house has been set out to the best advantage under the circumstances. The main aim was to have the honey arriving at one point and then moving forward without any extra handling or doubling back until it reached what could be called the delivery end. Some inconvenience is caused when supers have to be returned to the hives the same season.

The supers of honey are unloaded off a truck into the hot room from the outside. The warmed honey is then taken from an inside door to the uncapping equipment and from there to the extractor. The extracted honey flows into a heating and clarifying unit, and an automatically controlled pump then takes it to a row of 5 1-ton tanks set up on a high stand. After the honey has settled it is run direct into the processing tanks. At this stage the honey can be blended very readily by combining the honeys from several tanks. While filling of containers is being carried out from one mixer tank honey is being stirred in the other. In this way 5 tons of honey can be blended, processed, and packed quickly. After being packed containers are placed in the cooling room to speed up granulation and ensure a smooth grain. From this point the honey is ready for delivery to merchants and is in the best possible condition for consumption.

Equipment

Warming room: As this room was an addition to the existing building, the outside walls were constructed of asbestos sheeting and the inside was lined with a wood-pulp wallboard. No insulating material is placed between these two coverings. The warming room was designed to hold 216 supers—sufficient honey to fill the 5 storage tanks. The system of working is to take off surplus honey, perhaps for two days, until the room is filled. During that period the heating unit is maintaining a temperature of about 80 degrees F. With the number of supers on hand extracting operations can be carried on without any interruption until the tanks are filled. All extracting equipment can then be washed completely and made ready for the next round. Supers are stacked in the warming room on drip trays. These should be made fairly deep, because sometimes a considerable amount drips off the combs. Supers taken off above escape boards are not as likely to cause trouble as those taken straight off the hives.

The doors to the warming room are made to fit tightly. Pressure is maintained by a very simple application of the wedge principle. Two levers are bolted to the walls between two pairs of wedge-shaped pieces of angle iron. One piece of each pair is screwed on the door and the other on the wall. The tapers of each pair face in the reverse direction. Pulling the levers down clamps the door in position; the reverse gives a quick release. (See diagram and the illustration at right below.)

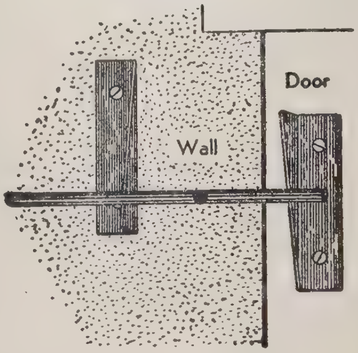


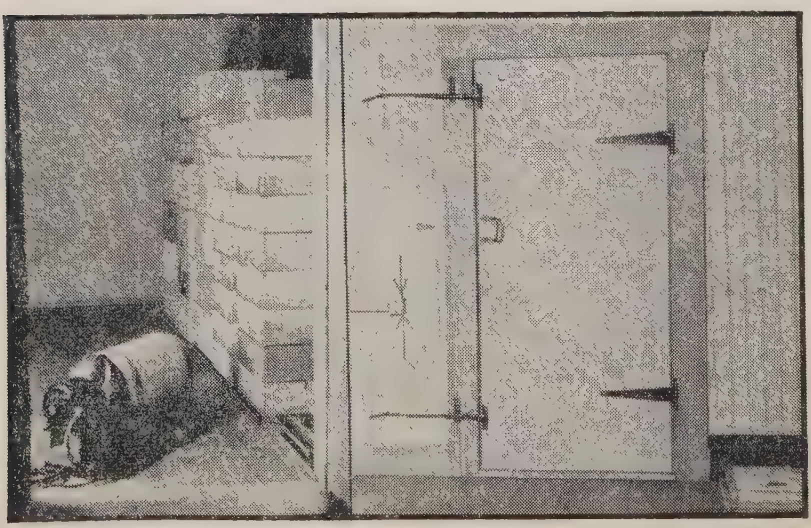
Diagram showing one of the sets of wedge-shaped pieces of iron and lever used to close the warming room door tightly.

Uncapping unit: This consists of an electric steam boiler for supplying steam to the uncapping knife and the hot tray. Cappings are allowed to drain in the water-jacketed container and the wax is melted finally by a top-heat element. The honey from the cappings drains into a bucket, but there is no reason why it should not run direct into the clarifying unit, which eliminates the risk of buckets overflowing.

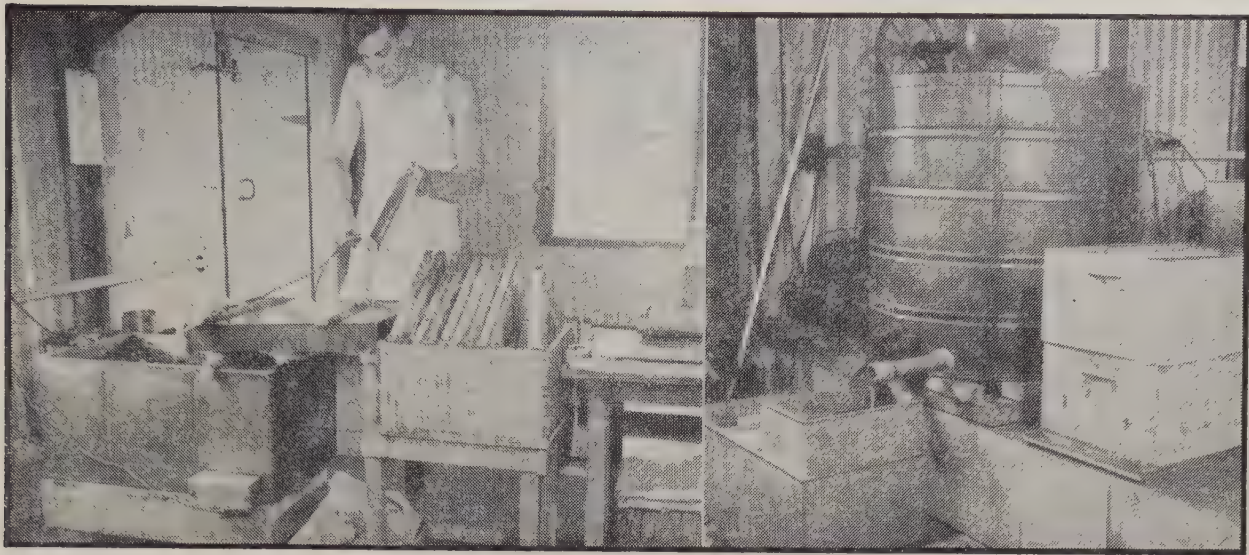
Extractor: A 6-frame Pender extractor is used and is capable of handling a large number of combs each day when one person is uncapping and another is operating the extractor. In this way honey can be extracted so quickly that the ordinary honey gate is unable to deal with it. The upper-right photograph on the opposite page shows the second outlet, which was necessary to keep the level of the honey below the extractor reel.

Heater and clarifying unit: This unit appears to eliminate most of the problems associated with the straining of honey. Much time is lost in hold-ups in a poor straining system. In Mr. Shoebridge's unit the honey is warmed and strained at the same time. The baffled compartments allow much of the fine wax particles to rise to the surface; they are skimmed off once or twice a day. At midday the immersed strainer is removed and washed. In this way straining is carried on all day without interruption.

Pump unit: The honey pump is controlled automatically. As the honey rises in the last compartment of the clarifying unit the pump is switched on and the honey conveyed through



Left—Inside of warming room, showing heating unit and supers stacked on drip trays. Right—Inside door of warming room, showing method of fastening the door.



Left—Uncapping unit, incorporating steam knife, hot tray, and wax melter. On the right are a pricker pad and table which are used on occasions to deal with thick honey. Right—Frame honey extractor and heating and clarifying unit with automatic pump control.

milk tubing to the storage tanks. When the compartment is empty the motor stops. By this system undue aeration of the honey is prevented, because the pump is running only when there is work to do. An extra fitting to the pump unit is a reversing gear. This enables honey remaining in the pipeline to be removed before the pipeline is dismantled for cleaning. Generally this operation is carried out by reversing the pump by hand.

Settling tanks: The 5-ton honey tanks are set up on a high stand. The illustration at left below shows clearly why this is necessary. Wallboard lids cover the tanks at all times. When a tank is being filled the delivery end of the pipeline is taken almost to the bottom of the tank, as this overcomes frothing of the honey. Another way of doing this is to direct the flow of honey from the pipeline to the side of the tank.

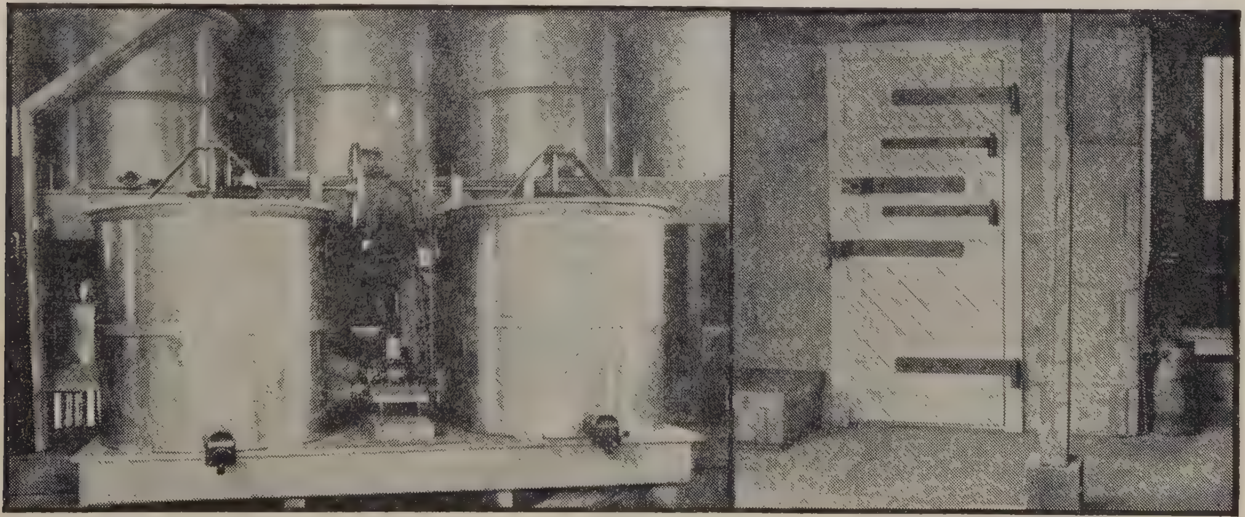
Stirring tanks: These are set up just below the storage tanks and as close as possible to the honey gates. Honey when cold is very viscous, and even when forced by a pump offers considerable resistance. Mr. Shoebridge found that to secure honey of the required condition for his local pack he had to leave the honey in the stirring tank for a day or so. By having two stirring tanks he was able to have one lot of honey being processed while the other was being emptied. Keeping honey in stirring tanks longer than usual reduces the time required in the cool room to set the honey finally.

Cool room: Early in the season the stirring in of starter honey is not sufficient to give the smooth, fine-grained honey so desirable, unless by some means the temperature is reduced to approximately 56 degrees F. A room kept cool by a refrigerating unit is used by Mr. Shoebridge. It is a compartment 6ft. x 6ft. x 6ft. high constructed of pumice blocks 4in. thick and lined inside with 4in. sheet cork. The door was secured from a dismantled commercial cool room. The ⅓ h.p. refrigerating unit is on the outside of the room.

Later in the season it is hardly necessary to use such a room, but for beekeepers who wish to pack their crop soon after extraction and avoid the expense of reliquefying honey, a cool room is almost a necessity if a high-quality pack is to be maintained.

Efficient Plant

The plant described is new and operates most efficiently. The system of storing a large number of honey supers and then extracting for several days is perhaps new to many beekeepers.



Left—Storage tanks and two stirring units. Right—Cool room; the refrigeration unit is near the window.

New Products the Town-milk Industry Could Market

A RECURRING problem in the town-milk industry is the disposal of seasonal milk surpluses profitably. Surplus town milk which is converted into butter or cheese does not realise a price which is related to that paid under the town-milk scheme for surplus milk, and the difference, broadly, is a drain on the taxpayer. In this article T. P. J. Twomey, Superintendent of Market Milk, Department of Agriculture, Wellington, suggests that a profitable market is at the disposal of the town-milk industry—a market which not only will benefit the industry but will give New Zealand housewives access to a range of dairy foods too long denied them.

AS New Zealand's milk-treatment stations have now been extensively re-equipped and standards of management raised to a high level, the time is opportune to call on their services to develop and introduce to New Zealand milk consumers milk products which, though new to this country, are demanded as of right by housewives from their town-milk industries overseas. These milk products, which include clotted cream, homogenised milk, chocolate milk, yoghurt, cultured buttermilk, and cottage cheese, are both palatable and nutritious, and when properly prepared and attractively packaged they soon build for themselves a steadily growing market.

The production and preparation of these foods require a high-quality milk supply, hygienic processing facilities, and efficient laboratory control. New Zealand's town-milk is of high quality, the processing plant is already available in the milk-treatment stations, and the growth of laboratory control in the stations has been a marked feature of the improvements effected in the industry during the past few years. By and large, therefore, the facilities are at the disposal of the industry, the technical knowledge necessary to the development of these milk products is available within the country, and all that is needed is the will to embark on a new commercial venture.

The potentialities and basic features of manufacture of these new milk products are dealt with briefly in this article. Fuller technical information can be obtained from the Dairy Division of the Department of Agriculture.

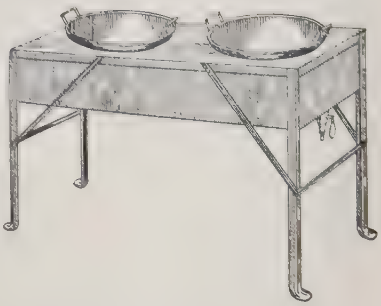
Devonshire or Clotted Cream

A luscious dairy product, Devonshire or clotted cream has been a speciality of the milk industry of Devon and Cornwall for generations. Before the war a thriving and profitable business was carried on not only through local sales in the west of England but through postal sales to many parts of England far from the point of manufacture. Clotted cream attains its greatest popularity during the soft-fruit season, and as Christmas follows hard on the soft-fruit season in New Zealand the potential market for clotted cream is considerable.

Clotted cream can be made from milk, from milk and cream, from skimmed milk and cream, or from cream by itself. Commercially it is made most easily from cream or from cream and skimmed milk. The process requires little equipment, a small, shallow, steam-jacketed vat, perforated ladles, and straining racks being the principal items. A vat 4ft. by 2ft. and 1ft. deep could be used to produce about 100lb. of clotted cream at each scalding. For smaller batches shallow pans could be used either separately or in conjunction with the vat.

For 100lb. batches cream and skimmed milk can safely be used. A layer of fresh skimmed milk is run into the vat to cover the bottom to a depth of 2 to 3in. Fresh 60 per cent. cream is then poured in carefully to form a 3in. layer on top of the skimmed milk. The cream and milk are left to settle for a short time until the two are in reasonably defined layers. Steam is then turned on in the jacket and the skimmed milk and cream raised to a temperature between 180 and 190 degrees F. This process, known as scalding, should take from 10 to 20 minutes. While scalding is going on care should be taken to avoid any agitation of the cream layer.

After being scalded the cream and skimmed milk are cooled by the circulation of cold water through the jacket; if it is found helpful, chilled water may be used as a further cooling medium. When cooled the cream, which should then be in a semi-solid layer on top of the skimmed milk, is scooped out with specially shaped perforated ladles and placed in shallow containers with perforated bottoms. Care should be taken to avoid damaging the texture of the clotted cream at this stage. The scald milk, as the serum is called, should be thoroughly drained from the cream and, mixed with the skimmed milk remaining in the vat, can be held in the cool store and reseparated the following day to recover any fat lost from the cream.

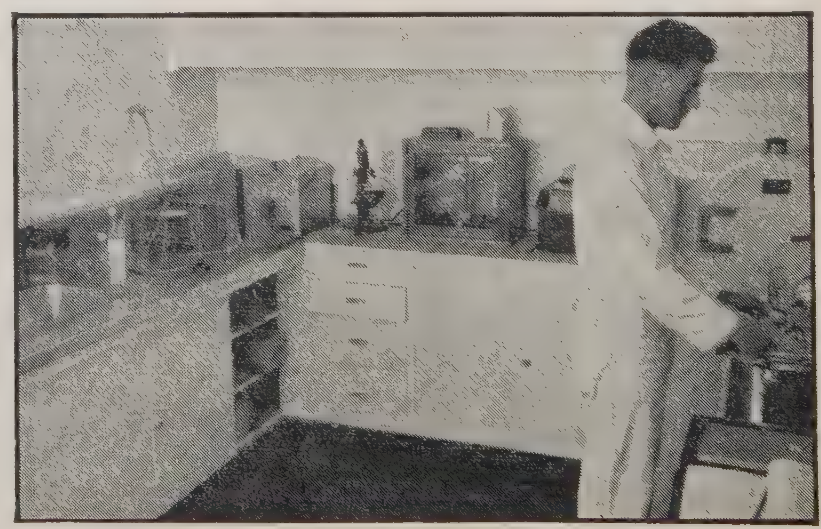


Setting pans and scalder as used in Cornwall and Devon for making clotted cream. Such pans, about 18in. in diameter at the top, sloping to 15in. at the bottom, and 6in. deep, are suitable for small-scale production.

After being drained the clotted cream may be packed in waxed cartons or in tins and sold immediately, or it can be stored overnight in the cool store and sold next day. The keeping quality is comparable to that of pasteurised cream.

When properly prepared, clotted cream has a moderately firm body and a characteristic granular structure. The crust should be golden with a pleasantly crinkled surface, and the whole product should taste rich and have a pronounced nutty flavour.

As 2 to 2½ gallons of milk are needed to produce 1lb. of the finished product, clotted cream is likely to be in the luxury-food class. It could probably be made in New Zealand to sell at 3s. to 3s. 6d. a half pound. In relation to the price of the soft fruits with which it would be used, this price need not be considered excessive.



[*R. W. Orr photo.*

Part of the laboratory at the Hastings milk-treatment station. The foods mentioned in this article should be produced under continuous laboratory control.

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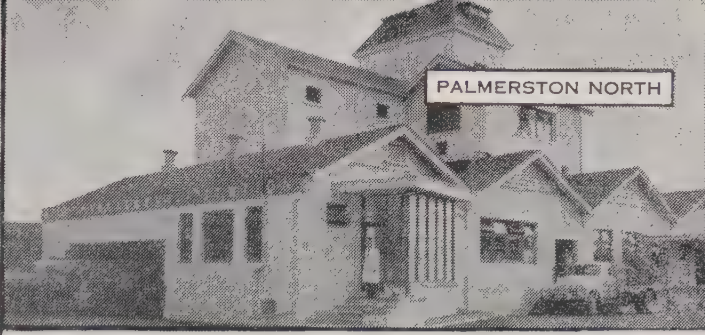

[*Photograph at bottom left by Jack Welsh and Sons.*
Well-equipped treatment stations are a feature of New Zealand's town-milk industry.

Homogenised Milk

Both dairymen and dietitians agree that the introduction of homogenised milk to New Zealand consumers is long overdue. It is very popular in America and Europe, and once introduced here should prove equally welcome.

In ordinary bottled milk the fat rises quickly to the top of the bottle, leaving a less-rich layer of serum beneath. Unless the bottle is shaken well before the milk is poured out, the creamy part is used first and the remaining milk in the bottle is much less rich when later it is poured off for use. However, processing through a homogeniser disperses the cream permanently through the whole of the milk in the form of very fine droplets, and the milk will not separate into layers as ordinary milk will.

In a milk-treatment station homogenisation is effected by by-passing the milk between the preheater section and the filter section of the pasteuriser through a homogeniser and a clarifier. In the homogeniser the milk is forced in a microscopic stream through a special valve under a pressure of 2500 to 3000lb. per square inch, the fat globules being broken into cream droplets too small to separate out in the milk when it is left standing. Homogenised milk must be filtered through a clarifier instead of through the ordinary cloth or cotton milk filter, so while homogenisation is in progress the filter is isolated and a clarifier is introduced into the circuit at the same point. Raw milk should not be homogenised.

As well as dispersing the cream permanently, homogenisation makes milk more acceptable to people who suffer from fat-intolerance and by whom ordinary milk cannot be taken as a drink. Homogenisation reduces the curd tension of milk by as much as half, the higher the homogenising pressure used the greater being the reduction. For this reason homogenised milk is claimed to be more easily digested than ordinary milk, a factor of consequence in infant feeding and in the dietaries of sufferers from stomach ulcers and related complaints.

Homogenised milk is better than ordinary milk for the preparation of cream soups and sauces and for general cooking. It has particular value in restaurants and hotels where milk is bought in bulk for use in tea, coffee, and other drinks. To the owner of the dairy shop it offers the added advantage that stirring before sale is unnecessary and there is little danger of samples failing to comply with the Food and Drug Regulations governing fat content.

The cost of homogenisation equipment is related to the capacity required. A milk-treatment station selling 200 to 500 gallons of homogenised milk a day should easily be able to cover all the extra expenses involved and make a profit by selling homogenised bottled milk at a premium of ½d. to 1d. a pint over ordinary bottled milk. The advantages to the housewife are worth this small extra surcharge, and it should not prove an obstacle to the promotion of sales.

Chocolate Milk

As its name implies, chocolate milk is milk combined with cocoa or chocolate; sugar, flavouring, an emulsifier, and a little salt are also added. It can be made from whole milk or from milk standardised to a slightly lower fat content. It has had a considerable market in America for many years. Though it is widely drunk by adults in America, probably its main attraction to New Zealand housewives would lie in its appeal to the younger members of the family who, though willingly spending 6d. on a milk shake, will turn up their noses at a glass of milk at home.

The production of bottled chocolate milk in a milk-treatment station calls for considerable detailed technical attention and for careful laboratory supervision. Special qualities of cocoa or chocolate must be used, and for small batches the use of one of the proprietary brands of cocoa or chocolate syrup available to the industry would probably be easier. The necessary quantity of sugar is already incorporated in these syrups.

In the making of larger quantities of chocolate milk the dry ingredients are customarily added to the raw milk and the milk and ingredients pasteurised together. Pasteurising temperatures are usually higher than for ordinary pasteurised milk, and if homogenised milk is not used, temperatures of the order of 165 degrees F. for 20 to 30 minutes are desirable to prevent a dark cream layer forming on top of the milk.

Chocolate milk contains about 1½ per cent. of cocoa and 5 per cent. of sugar. The proportion of sugar can be higher, but excessive sweetness tends to cloy and thus to reduce consumption. In the home the product can be cooled and served as an iced drink or heated and offered as hot chocolate.

In New Zealand bottled chocolate milk could probably be sold for 6d. a pint, and efforts should be directed toward selling it as an extra rather than as a replacement of part of the liquid-milk sales. It tends to appeal most to people who dislike milk as milk but who would buy and use milk if it were offered in a more palatable form.

The town-milk industry could well bear in mind that chocolate milk sold retail at 6d. a pint is more profitable than milk sold in bulk at 3½d. a pint to be resold later at about 1s. a pint as milk shakes.

Cultured Buttermilk

It is frequently claimed that New Zealanders do not take kindly to sour-milk products, but it is difficult to assemble data from which such a conclusion can be drawn. Even if the assertion is generally true, it does not of itself invalidate an attempt to alter the situation. Sour-milk foods can be made attractive and appetising, and though such a product as cultured buttermilk may be new to New Zealand housewives its introduction at the right time and in the right way could soon break down any prejudice that exists and build for itself a growing circle of customers. In America cultured buttermilk sells in enormous quantities, and these sales generally are in addition to normal liquid-milk sales.

Buttermilk is the liquid remaining after cream has been turned into butter in a butter churn, but cultured buttermilk is a different product. It is made commercially from pasteurised, freshly separated skimmed milk to which is added about 2 per cent. of a starter or culture. The flavour of cultured buttermilk approximates to the popular conception of what buttermilk should taste like but seldom does; it gives the impression of having a substantial body with a smooth, fresh, acid taste.

It is prepared by adding 2 per cent. of a lactic starter to good-quality skimmed milk to which 1 to 2 per cent. of fat has been added. The skimmed milk is first pasteurised at a temperature of 160 to 165 degrees F. for 30 minutes and then cooled to 70 degrees, at which temperature inoculation is effected. The milk is left undisturbed at this temperature for 12 to 15 hours until an acidity of about 0.8 per cent. has developed and a smooth coagulum has been attained. The milk is then agitated gently and cooled to 40 to 50 degrees. It can then be bottled, care being necessary to ensure that no serious rise in temperature takes place during the process. After being bottled the buttermilk should be stored at 40 degrees or below and kept at a low temperature during distribution, which should not be unduly delayed.

The manufacture of cultured buttermilk needs little plant and equipment, a starter cabinet and an ordinary batch pasteuriser with modified agitators being the main items required. The

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cost of the fat-fortified skimmed milk can be estimated at 1d. per pint and the cost of bottling at about the same. Care must be taken in the storage and delivery of the product, but a selling price of 3d. a pint should prove remunerative. At this price cultured buttermilk represents to housewives a bargain in nutritional value.

Yoghurt

Like cultured buttermilk, yoghurt is a fermented milk product with a noticeable but pleasant acid taste. It is widely drunk overseas, not only as a pleasant beverage but for the benefits it offers to some sufferers from stomach complaints. In the popular mind yoghurt is associated with the longevity of certain Balkan races, notably the Bulgars, and therefore has perhaps been too widely acclaimed as a cure for many human ills. However, it has been found to have certain therapeutic advantages and its introduction to New Zealand dietaries could well be encouraged.

Yoghurt is best prepared commercially from fresh milk to which about 5 per cent. of spray-dried skimmed-milk powder has been added. The milk is then either flash pasteurised or pasteurised at 180 to 185 degrees F. for 30 minutes and cooled to 110 to 115 degrees, at which temperature inoculation with 2 per cent. of yoghurt starter is effected. The yoghurt culture contains three distinct types of micro-organisms and should be obtained from a firm specialising in such cultures; it is doubtful if a commercial culture for the production of yoghurt can be obtained in New Zealand at present.

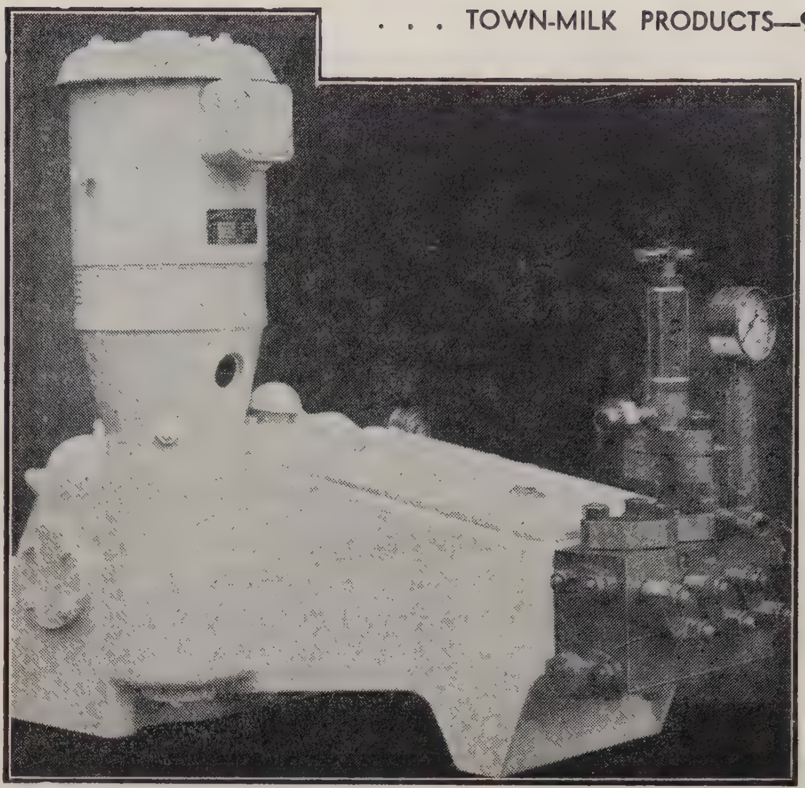
After inoculation the milk should be mixed thoroughly, then bottled and capped immediately, usually in quarter-pint bottles. The filled and capped bottles should be incubated in a water bath or other incubator at 110 to 115 degrees F. for about 3 hours. At the end of this period coagulation should have occurred, and the bottles should be removed from the incubator and placed in a refrigerator or cool room for at least 8 hours, after which they are ready for delivery.

When properly made yoghurt is thick and has a noticeably acid taste. If it is made from high-quality milk, it has a keeping quality about twice that of ordinary pasteurised milk.

The special equipment necessary for the manufacture of yoghurt includes a starter cabinet, a batch pasteuriser, an incubator, and a filler and capper capable of handling quarter-pint bottles; third-pint bottles, for which most fillers are adapted, could be used equally well. In view of the extra labour which would be involved in manufacture, yoghurt probably would need to be sold at 3d. a quarter-pint bottle to cover the cost of manufacture and bottling and to return a reasonable profit. Possibly a reduction could be made for standing orders.

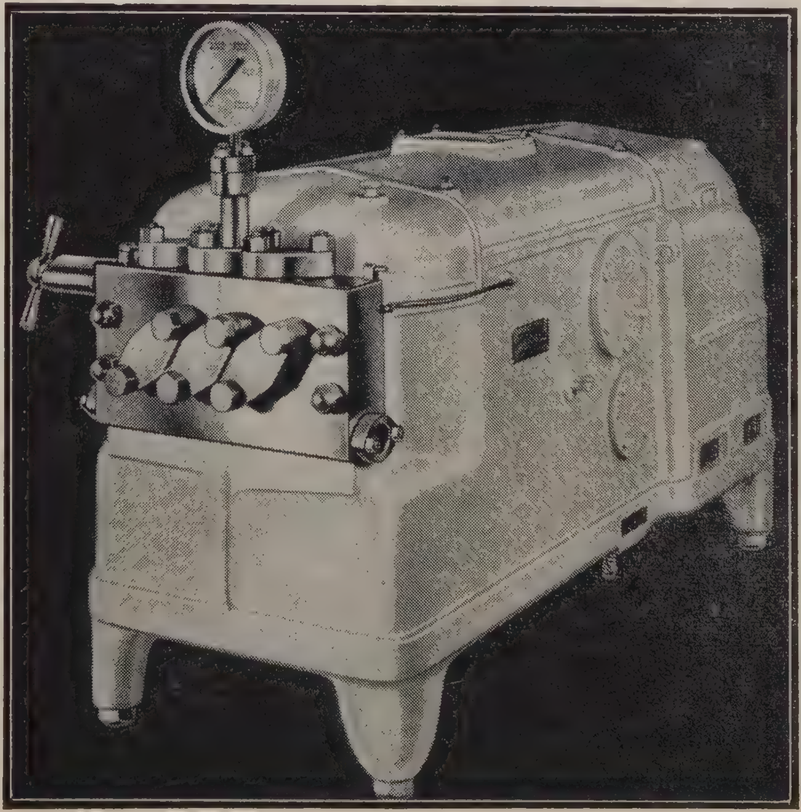
Cottage Cheese

A skimmed-milk product of high nutritional value and low cost, cottage cheese can be sold as an almost fat-free product or as creamed cottage cheese, which is enriched before sale by the addition of cream. It is an unripened, soft cheese in which only a mild acidity is allowed to develop, not to be confused with cream cheeses of the Gervais or Bondon type, which are made from whole milk with or without added cream.



[G. and J. Weir photo.

Two types of homogenisers. These machines force warm milk through a fine orifice under very high pressure, thus distributing the cream evenly through the body of the milk.



Jack Welsh and Sons photo.

One of the cool rooms in the Dunedin milk-treatment station. Cool storage suitable for the products described in this article is available in the treatment stations.

Cottage cheese is made widely in milk-treatment stations overseas, but its manufacture in milk-treatment stations in New Zealand may involve administrative difficulties. The manufacture of any cheese in the Dominion is closely controlled by Government regulations and is considered to be an exclusive function of the established cheese factories. Consequently, if the authorities of a milk-treatment station wish to investigate the possibility of making cottage cheese, it is advisable that the project first be discussed with the Director of the Dairy Division.

The advantages in making and selling cottage cheese lie in its utilisation of skimmed milk, which otherwise is a surplus product in the town-milk industry, and in the opportunities it offers to handle successfully the excess production from small quantities of homogenised milk. To the housewife it offers a new and nutritious product for use in cheese cakes, cheese tarts, salads, and sandwich fillings.

Its manufacture follows orthodox cheese-making practices, except that the skimmed milk should first be pasteurised at 145 degrees F. for 30 minutes and set at 70 to 72 degrees, with or without the addition of rennet. Cutting, cooking, draining, and washing are all arranged to provide a small, firm curd. After being washed the curd is chilled to assist firming and about 1 per cent. of salt is added and well stirred in. The finished curd can be packaged into cartons or glass jars for immediate sale or can be stored in cans at 32 to 36 degrees for 4 or 5 days before packaging and retail sale.

If creamed cottage cheese is to be sold, about 1 part of 20 to 25 per cent. cream is thoroughly incorporated with 3 parts of the finished curd. Creamed cottage cheese does not store well and should be prepared as necessary from the ordinary cottage cheese withdrawn from the cool store.

Under proper conditions of manufacture 10 gallons of skimmed milk will produce 15lb. of cottage cheese, and this could be retailed at 3d. to 4d. per ½lb., depending on the type of package used. Creamed cottage cheese would then need to be offered at 6d. or perhaps slightly less per ½lb. Regular orders would probably justify a small discount.

Orange Juice

Though not a dairy product, bottled orange juice is rightly considered by the dairy industry overseas as a food product which lends itself to retail distribution in conjunction with bottled milk and related products. Ordinary milk is not naturally rich in vitamin C, but orange juice is one of the richest sources of this vitamin. Milk and orange juice are complementary foods. Orange juice as ordinarily sold by the dairy trade is freshly prepared and palatable, can be packaged attractively and cheaply, and can provide a useful introduction in the building of good will for the milk products described.

As normally prepared and distributed by the dairy trade in America, Canada, England, and elsewhere, orange juice is made either from orange pulp or from fresh oranges. If the oranges must be imported into New Zealand, the use of imported orange concentrate would probably be preferable. The orange juice, whether it is prepared from fresh oranges in the treatment station or from orange concentrate, can be processed in an ordinary stainless-steel batch pasteuriser and bottled and capped on the standard filling machine. It is then stored in the milk cool room and held overnight at 40 degrees F.

The orange juice is usually prepared daily and distributed within 24 hours. It is customarily sold in half-pint disc-mouth bottles differing slightly from milk bottles. The advantage to the customer of having bottled orange juice supplied through the treatment station is largely one of freshness, as the juice is prepared and distributed daily. In addition, the housewife has the orange juice delivered regularly to her door.

To the milk-treatment station the retail distribution of freshly prepared orange juice provides two advantages, one being the utilisation of existing equipment with consequent reductions in overhead, and the other the additional sales approach offered by the appeal of the product to diet-conscious housewives. It is not suggested that the preparation and sale of fresh orange juice will directly increase the sale of milk and town-milk products, but the promotion of such a product could have quite a useful indirect effect in increasing milk sales; that has been found so in other countries, and the pattern could well be repeated in New Zealand.

Distribution of Milk Products

There is no contact between milk vendor and customer in New Zealand; in fact, the term vendor is a misnomer, as it implies selling, whereas the service given is only delivery. To be successful, the introduction of the products described in this article must surmount this obstacle. Therefore it is suggested that a milk-treatment station which decides to enter this market must be prepared to do the promotion, selling, and delivery itself, at least at first, though homogenised milk could be distributed on the existing rounds. This arrangement would enable the promoters of the products to seek and service their customers directly and to build up an effective and continuing good will.

In the early stages at least liaison between the station, its laboratory, and its customers and prospective customers should be close to enable rapid changes in policy to suit the market. Once a delivery round is established it might pay the station to contract with the existing milk vendors for the delivery of the product on a fixed figure and commission basis. Such deliveries require more care than ordinary delivery. However, the margin allowed for the delivery of the product in the figures quoted is small and may not appeal to vending interests. As an alternative the possibility of extending sales through the better class of milk shops may be worth investigating.

It is important that delivery be made during the day, as much of the success of any such manufacturing programme would depend on personal approach to the housewife. Personal salesmanship should be strengthened by local Press and possibly radio advertising, and the advantages of free trial samples should not be overlooked. The good will of local Plunket and nursing circles and of doctors in the district should be courted and visits to the treatment stations encouraged even more than usual.

A new and lucrative market is waiting to be tapped by the town-milk industry in New Zealand. Town-milk products should be the preserve of the industry, but if the industry lets the market go by default, as it did the manufacture of ice cream, it will have only itself to blame. Milk treatment when confined to milk and cream alone is not very profitable; the introduction and manufacture of these special products can be developed in New Zealand as elsewhere to change this position to the benefit of the industry as a whole.

Losses among Pigs Can be Reduced

DURING the past two seasons a number of farmers have co-operated with supervisors of District Pig Councils in keeping a record of all pigs born and of losses on the farm. In this article A. Longwill, Superintendent of the Pig Industry, Department of Agriculture, Wellington, summarises the main findings of the survey and discusses some of the means of improving production per sow.

Though there is a bigger risk of losses in large litters, prolific sows are desirable. The biggest litters weaned come from litters of 13 pigs born.

WHEN it was decided about 3 years ago to carry out a survey on farms producing pigs to establish a clearer picture of the incidence of losses and, if possible, to suggest ways in which these might be reduced, a brief outline of the information available at that stage was published in the March 1949 issue of the "Journal". Records from 277 farms in 1949-50 and 155 farms in 1950-51 have been analysed. As these farms represent only about one-third of those included at the start of the survey each year, they cannot be regarded as giving a true cross-section of producers' results. On the whole those withdrawing from the survey would probably have higher than average losses and therefore the losses shown are conservative as an estimate of the national situation.

The farms completing records had 1 sow to 10.4 cows compared with the Dominion ratio of about 1 sow to 25 cows. The farms marketed 11.6 pigs per sow, whereas the average number sold throughout New Zealand per sow for the 5 years ended September 1950 was 9.5. These facts support the conclusion that the survey data are based on above-average efficiency. This is not a serious disadvantage as long as it is realised that the over-all situation is less favourable than that indicated.

Number of Pigs

A summary of results of 4169 litters covered during the two seasons is given in Table 1.

An important point is that though in the two seasons there was very little variation in the numbers born and weaned per litter, there was considerable variation in the numbers weaned per sow per year.

This was accounted for mainly by the fact that in the first season sows averaged 1.80 litters each, while in the second, probably due to inadequate feeding, the average was only 1.64 litters in the 12 months covered by the records. A dry summer was experienced in the Auckland Province in 1949-50, which resulted in many sows being poorly fed during January, February, and March 1950. This had the effect of making it difficult to get a number of sows to maintain a regular breeding cycle.

Management of the Dry Sow

A weakness in the typical system of sow management in New Zealand is that dry sows depend very largely on grazing on either cow paddocks composed largely of ryegrass and white clover or on pig pens consisting almost entirely of ryegrass. Though the former are much better than the latter, growth may be so slow in a prolonged dry spell that sows cannot maintain themselves on pasture alone. The extensive use of pastures does reduce the cost of maintaining breeding stock, and probably will always be desirable in New Zealand, but a safeguard against drought is necessary. This could be provided by lucerne or annual crops such as green maize, carrots, or rape (according to the district) while grain and meals are scarce.

During winter, too, pasture growth alone is inadequate for sows. Autumn-saved pasture may help to provide a satisfactory ration, but some meal feeding is desirable.

Irrespective of the season sows must be fed so that they recover condition rapidly after their litters have been weaned and flush up automatically when they are mated. If improvement in the sows' condition continues until they are in pig or until they are in good, firm breeding condition, sows will be able to maintain themselves on grass or farm-grown crops and will require little of supplementary feeding for the remainder of the gestation. Dry sows whose litters have been weaned should not be put out to subsist on poor, dried-up pasture if regular breeding is desired, and unless sows are kept breeding regularly they are not being used efficiently. The breeding programme gets out of step, pigs are not in hand when required and there is a surplus of pigs when food supplies fall off.

Percentage Loss Recorded

Losses to weaning were 22 per cent. in the first year of the survey and 25 per cent. in the second. For the two seasons and for 36,745 piglets born the loss to weaning was 8632 or 23.5 per cent. A further 1316 or 3.6 per cent. of pigs born were lost after weaning. Thus a total of 27 per cent. of all pigs born were lost on these farms.

Details for 2117 litters involving 19,725 piglets born give a clearer picture of losses. In these litters 5394 piglets or 27.4 per cent. of the total born were lost before weaning. These losses were heavier than the average recorded. However, more than half of these losses were classified as "born dead" or "died at birth". The causes of these losses are as yet obscure and can be established only by scientific research. The balance of piglets lost, about 45 per cent. of the total loss to weaning, can be considered as having had a chance of survival; these deaths, therefore, were mainly the responsibility of pig raisers. Two-thirds of these are lost by overlying and the remainder about equally in the categories "runts died or destroyed", "disease", or "accident".

TABLE 1—PIGS BORN AND WEANED PER LITTER AND PER SOW PER YEAR.

Season	No. of litters	No. of pigs born	Average number of pigs per litter Born	Average number of pigs per litter Weaned	Average number of litters per sow per year	Average number of pigs per sow per year Born	Average number of pigs per sow per year Weaned
1949/50	2754	24,834	9.0	6.9	1.80	16.3	12.5
1950/51	1415	12,809	9.1	6.8	1.64	14.7	11.1
2 seasons	4169	37,643	9.0	6.9	1.77	15.8	12.2

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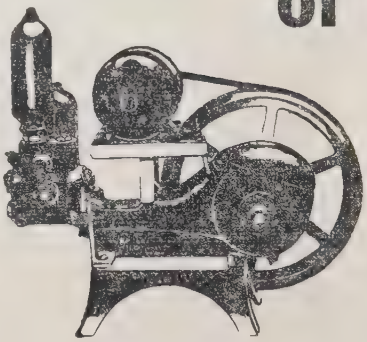

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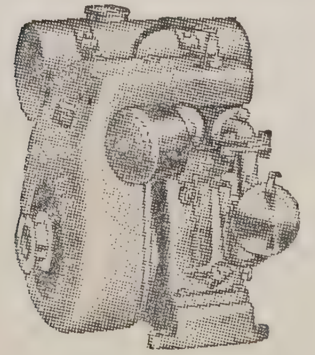

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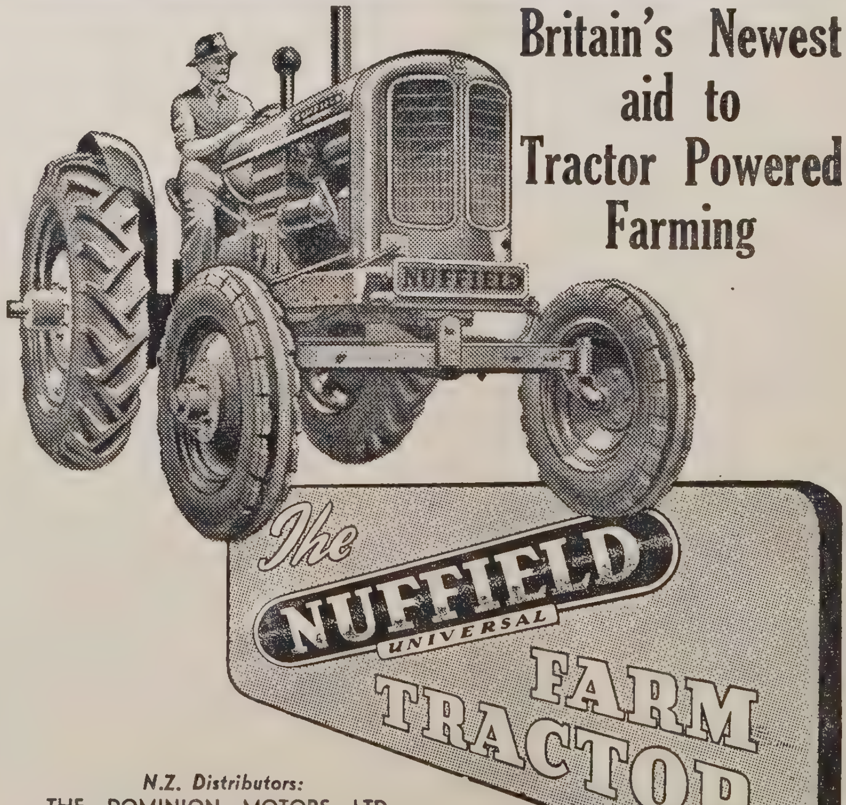

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Reduction of Overlying

Of the losses which can be classed as preventable, losses by overlying are by far the commonest. For many years farmers have pinned their faith to farrowing rails in the farrowing houses to reduce losses, but it is clear that, despite the use of farrowing rails, many pigs are overlain, frequently in the centre of the floor. Other means of reducing losses from overlying which have been tried include sloping floors (1in. slope per 1ft.) and the provision of artificial heat to attract the piglets away from the sow.

There is a good deal of conflict of opinion regarding the merits of a sloping floor with a hover board at the lower end as protection for the piglets. A sloping floor with artificial heat in the hover seems from overseas results and some experience in New Zealand to be worth a trial. However, it has not yet been proved that the arrangement is likely to be more successful than the provision of artificial heat only in some form of hover or brooder to which the piglets have access for a few days after birth (or longer in cold weather). It is essential to keep newly born pigs warm.

Good temperament and mothering instinct in the sow are most important. It is a bad policy to persist with sows which do not have the right disposition.

Sows should not be allowed to become over-fat before farrowing. This applies particularly with sows which have had 5 or 6 litters. In this survey losses were least in the second- and third-litter sows, but did not rise steeply until the seventh and subsequent litters.

Bad feeding methods which may result in digestive upsets close to farrowing time must be avoided. It is essential that sows should be fed during the period of early gestation to ensure that reserves upon which they can draw during lactation are built up. If this is done, there is no need to feed sows heavily before farrowing. Provided the daily ration fed during late pregnancy contains sufficient protein (2 gallons of skimmed milk or 1¼lb. of meat meal), piglets should be well developed at birth.

Weaning management is important. Crop feeding before weaning and the provision of feed of good quality over the critical period will help to reduce post-weaning losses.

Post-weaning Losses

Although farmers are more keenly aware of losses among weaned pigs than of those among younger pigs, the former losses account for only 4.7 per cent. of the pigs weaned. Losses among purchased pigs were higher—7.5 per cent. of pigs purchased. The financial loss for weaned pigs was not as great as that for pigs to weaning. However, losses after weaning, especially among newly weaned pigs, where losses are heaviest, could be reduced by improving weaning management.

Weaning must be recognised as a critical stage in the pig's life. There is a vast difference in feeding value between sow's milk and skimmed milk and this gap can be bridged in two ways. First, pigs before being weaned must be encouraged to take as much of their food as possible from the creep rather than from the sow. There is then little change at weaning. Secondly, the change in nature of the feed—skimmed milk is too bulky and too deficient in fats and their associated vitamins for young pigs—should be offset by continuing the meal feeding started in the creep and by adding a little tallow, if pigs have a run on grass, or a little codliver oil of known vitamin potency, if there is no run.

The measures described and improvement of hygiene and feeding management would reduce losses among weaned pigs considerably. Serious diseases of pigs are almost unknown in New Zealand, although salmonellosis (blue belly) can be fairly serious in individual herds. Research aimed at finding means of protecting pigs from this disease is proceeding.

Financial Loss

On the basis of a sow population of 74,000 (1950 census) the data obtained from this survey show that the total loss to weaning (3.6 pigs per sow per year) is about 266,000 piglets. Similarly the post-weaning losses, on the assumption that the survey farms are representative of the industry, would be about 42,500 pigs.

However, this assumption would lead to the expectation of 860,000 pigs marketed (12.2 pigs per sow per year less 4.7 per cent.) or 11.6 pigs per sow. Actual marketings are known to be slightly less than 10 per sow. Therefore the number of pigs born, weaned, and marketed per sow is lower in the industry generally than is revealed by the survey. This is almost certainly due to a lower reproductive rate on most farms than on the survey farms. Regularity of breeding can be influenced by feeding management of sows and therefore there is scope for making more effective use of breeding stock.

At a very conservative estimate the above-mentioned losses represent over £500,000 annually, as follows:—

	£
266,000 piglets (loss to weaning) at £1 10s.	399,000
42,500 weaners, etc., at £3 10s.	158,750
	557,750

It could be argued that all the pigs lost could have been fattened on food available if they had been saved. If they are valued half as porkers and half as baconers, the loss represents over £2,000,000. The true loss probably lies between this figure and £500,000. However, it is easier to evaluate it than to find how losses may be reduced appreciably. The extent of the losses does not appear to be reduced greatly by better management, but more

TABLE 2—PERCENTAGE NUMBER OF LITTERS ACCORDING TO MONTH OF FARROWING AND AGE WHEN WEANED EXPRESSED AS PERCENTAGE OF TOTAL LITTERS FARROWED IN EACH MONTH (Totals for 2 years)

Age at weaning (weeks)	Jan. per cent.	Feb. per cent.	Mar. per cent.	Apr. per cent.	May per cent.	June per cent.	July per cent.	Aug. per cent.	Sept. per cent.	Oct. per cent.	Nov. per cent.	Dec. per cent.	Total
5	4.2	3.9	1.9	2.6	2.5	3.2	2.3	6.3	4.6	3.5	3.1	2.3	3.4
6	35.5	34.4	27.1	18.0	12.9	10.9	16.2	14.2	15.6	10.2	14.2	34.6	20.7
7	13.1	11.6	7.5	14.4	17.9	16.6	20.2	14.4	9.6	15.6	14.2	13.5	14.5
8	44.3	44.9	57.0	55.7	57.7	60.8	54.9	57.5	58.6	64.4	59.1	45.2	54.4
9	2.9	5.2	6.5	9.3	9.0	8.5	6.4	7.6	11.6	6.3	9.4	4.4	7.0
	11.6	7.3	5.5	5.0	7.2	10.3	12.1	9.4	7.7	6.6	7.4	9.9	100.0

regular breeding might be the answer. The difference between the number of pigs marketed on survey farms per sow and the Dominion average was 1.9 pigs per sow. For 74,000 sows this represents 140,000 pigs, which, valued half as porkers and half as baconers (average £6 10s.) are worth £910,000.

Food is available for fattening more pigs and better feeding and management of sows immediately after they have weaned their litters should give very valuable results. This probably applies with greatest force to sows weaning their litters between January and July and may account, in part, for the relatively small percentage of sows which are farrowed in the ideal times to suit the New Zealand food supply, May-June and November-December.

Arrangement of Farrowing Dates

Table 2 (on the previous page) dealing with all litters over the 2 years of the survey, shows that though some attempt has been made to bring a larger proportion of sows in just before cows calve, the proportion is not as high as it should be and the peak is reached 6 weeks to 2 months late.

An effort should be made to bring farrowings forward so that instead of having only 7 per cent. of total farrowings in May and November and 10 per cent. in June and December 20 per cent. of farrowings occur in May and again in November; that is, about 40 per cent. of the sows should farrow in June and December and the remaining 20 per cent. in July and January. In whey-feeding districts it is preferable usually to have farrowings concentrated in April and October. As far as possible sows should not farrow in August, September, February, and March.

An analysis was made of the dates of farrowings of maiden sows brought into the herds on farms surveyed. Most farrowings occurred in July and January and far too many spread into August and September and February and March.

It is apparent, therefore, that the advantages of earlier farrowing in fitting the supply of pigs to the dairy by-products food supply are not as widely appreciated as they should be.

Selection of Breeding Sows

Prolificacy is an expression of the sow's inheritance rather than of management. This indicates the need to select breeding sows for prolificacy. It indicates also that there is reasonable assurance of making progress if prolificacy is assessed under ordinary farm conditions, although these may vary. What degree of prolificacy is desirable can be deduced from Table 3, which sets out the losses to weaning and number of piglets weaned in litters of various sizes from 6 or less to 17 or more.

Though the percentage loss increases with increase in fecundity of the sow, there is a net increase in the number of pigs weaned per litter up to the level of 13 pigs born per litter. Under present standards of weaning and management it would be worth while to select for prolificacy up to this level, but until ways of preventing more of these losses are found, there would generally be no advantage in selecting for any higher degree of prolificacy.

In prolificacy the Large White breed appears to have well-marked superiority. For 10,470 births where breed of sow was recorded in the survey the average number born per litter was 8.9. Large White sows, with 9.6 born per litter, were the only pure breed which was above average. All crosses with the Large White were also above average.

There are strain differences in all breeds and it is necessary to select for prolificacy in all breeds. The practice of the New Zealand Pig Breeders' Association of stating the numbers born and reared in all registrations in the New Zealand Herd Book should assist pig raisers if they make full use of the information and take sufficient care in their selection of sows.

Conclusions

The main conclusions from the survey may be summarised as follows:—

The percentage loss to weaning on the survey farms is comparable with that recorded in other countries as also is the number of litters per sow per year. However, prolificacy of New Zealand sows does not compare favourably with those in overseas countries and points to the need to take advantage of the most prolific breeds and strains established if maximum output per sow is to be achieved. It has been shown that with higher prolificacy a progressively higher percentage loss to weaning may be expected and therefore the losses position in New Zealand does not compare favourably with that in countries with more prolific breeding stock. This reflects unfavourably on New Zealand standards when the natural advantage of grazing range for breeding stock is taken into consideration.

Losses in pigs appear to be relatively little affected by known factors of management. Sow nutrition, to the extent that it is responsible for increasing the weight of piglets at birth, can assist in reducing losses, but the method of ensuring this, under New Zealand conditions, has not been established. An entirely new attack on the sow-management problem is needed.

The low output of pigs per sow is attributable to low litter frequency and low fertility. Regular breeding can be assisted by feeding sows well after they have weaned each litter to ensure that they regain lost weight rapidly.

The method of raising the general level of prolificacy in the pig population is to take advantage of the breed which is superior and, by progeny-testing methods, to maintain improvement of desirable characters.

Of the artificial means of reducing overlying the provision of artificial heat appears to be best. If this can be substantiated by research, it will be necessary to determine what form of brooder is most suitable for the average New Zealand piggery and if it is desirable to use it throughout the year or only in the cold months.

Of the general data secured, in addition to those on losses, those on distribution of farrowing dates deserve special attention. The reasons for an insufficient concentration of farrowings in May and June and November and December should be investigated.

TABLE 3—LOSSES TO WEANING ACCORDING TO SIZE OF LITTER BORN

(Analysis of 1000 litters taken at random)

Number of litters	Number born in litter	Total number weaned	Average number weaned per litter	Number of losses to weaning	Percentage loss to weaning (based on total born)
137	6 or less	566	4.13	115	16.8
119	7	686	5.76	147	17.6
148	8	983	6.64	201	16.9
155	9	1,128	7.26	267	19.1
144	10	1,134	7.87	306	21.3
113	11	967	8.55	275	22.1
92	12	815	8.86	285	25.9
38	13	355	9.34	142	28.5
21	14	179	8.53	115	39.1
20	15	164	8.20	138	45.7
*7	16	75	10.71	37	33.0
*6	17 or more	55	9.16	51	48.1
1000	(Total born 9,186)	7,107	7.11	2,079	22.6

* Number of litters too small for these figures to have any significance.

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REGISTRATION OF

DAIRY FACTORY MANAGERS

Intending applicants are hereby notified that applications for registration under the Dairy Factory Managers' Regulations should reach the Registrar, Dairy Factory Managers' Registration Board, c/o Department of Agriculture, P.O. Box 2298, Wellington, on or before 1 April 1952. Forms are available from the Registrar.

Attention is drawn to the fact that any application which is received by the Board after 1 April 1952 shall not, except in special circumstances, be considered by the Board until after 1 April 1953.

E. M. EDGECOMBE,
Registrar.

N.B.—*This notice refers to persons who are NOT AT PRESENT HOLDERS OF CERTIFICATES. Notice of renewal and renewal form will be posted to every registered manager by the Registrar.*

HOMESTEAD SHELTER

The importance of adequate and well-planned shelter round the farm homestead has long been recognised, and in response to the demand for information on the subject the Department of Agriculture has published recently Bulletin No. 346, "Homestead Shelter Planting".

The bulletin can be obtained free from the nearest office of the Department of Agriculture.

◆

The Home Garden in March: Harvesting and Storage of Crops for Winter Use

By C. L. NAPIER, Orchard Instructor, Department of Agriculture, Hastings

ALTHOUGH some crops of "winter" vegetables will have been harvested, there are many districts where gardeners will be turning their attention to the selection of crops for storage in preparation for winter use. A well-planned garden should contain a variety of vegetables suitable for storage, and if the gardener makes sure crops are mature and harvests them carefully, he should have available a wide variety of vegetables over the greater part of the year.

Careful feeding of and attention to growing crops during the season will ensure good-quality products.

THE varied climate of New Zealand governs somewhat the types of vegetables home gardeners can store and also storage methods. In the north, for instance, it might be possible to allow root crops such as carrots and parsnips to over-winter in the soil. In the south, however, or in any district where the soil is extremely wet during winter, lifting of these crops and storage under more suitable conditions will probably be necessary.

Maturity Important

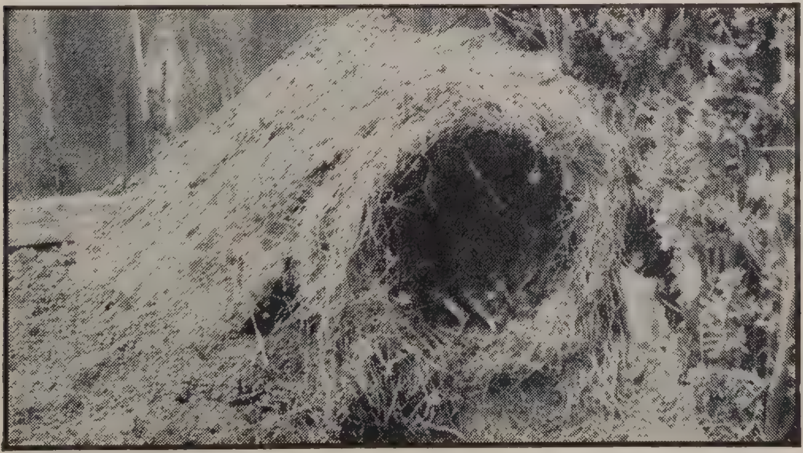
Before some vegetables can be stored successfully there are several principles which must be observed. First, and perhaps most important, the vegetables must be mature. Immature vegetables tend to lack flavour, lose moisture, and are more subject to decay; overmature ones tend to lose their characteristic flavour and some kinds are often "woody".

Careful Handling and Examination

All crops being prepared for storage fresh should be handled with care. Many storage rots gain entry through minute bruises or punctures in the skin which can pass unseen by the gardener. Careful handling eliminates much waste which might otherwise occur. All vegetables for storage should be examined very closely for evidence of disease, damage, or skin blemishes that may lead to disease. Inclusion of one diseased or damaged potato in an otherwise healthy sack would probably result in heavy loss of tubers, because of spread of rots by contact with adjacent tubers.

Storage Conditions Vary with Crops

All vegetables do not store successfully under the same conditions of temperature and relative humidity. If temperature and humidity, which are the most important factors affecting storage conditions, are not satisfactory, storage rots will be encouraged. Generally, most vegetables keep best in temperatures slightly above freezing point. The relative humidity requirement varies, however, and may range from very dry to quite moist. Unfortunately, most home gardeners have not the equipment for providing ideal conditions.



This "barrel pit" has been constructed in a position sheltered from the weather. The outside coatings are of straw and soil.

All Varieties not Suitable for Storage

All varieties of vegetables are not suitable for storage; therefore gardeners should select and grow those that will deteriorate as little as possible. Some varieties of onions, potatoes, and pumpkins are poor keepers and are suitable only for immediate use. This applies also to those varieties grown as early crops, because if they are left growing until storage is necessary, they tend to be poor in quality and flavour. Late or main-crop varieties are more suitable, because they generally have a slower or longer growing season in which storage qualities are able to develop better. Conversely, some fast-growing varieties usually grown as spring crops keep poorly if stored for long.

Storing Root Crops

Unless soil conditions are satisfactory during winter, all root crops including carrots, parsnips, beetroot, swedes, and turnips are best lifted and stored in more suitable situations. Wet soil and frosts can cause rots in all types of root crops and cracking of carrots, turnips, and beetroot. In winter also soil conditions often do not allow the lifting of these vegetables when they are needed.

Harvesting should not be delayed and if the roots are lifted as soon as they

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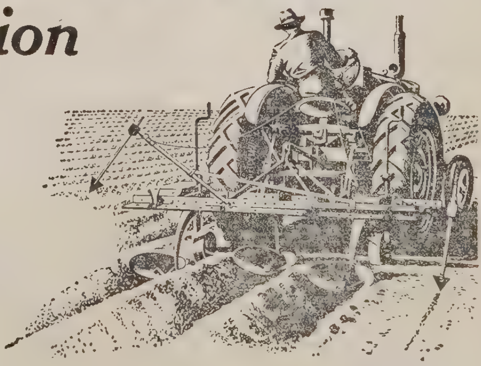

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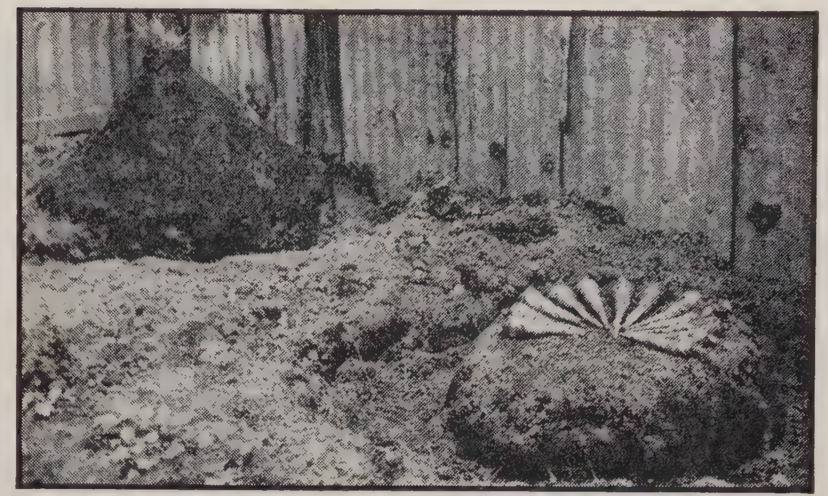

Left—A completed clamp of root vegetables, showing the straw ventilator. Right—The base of a clamp, showing the surrounding drain and part of the first layer of roots in position.

reach maturity, they should store in excellent condition. Vegetables to be set aside for winter should be of good quality and gardeners should ensure this by adequate feeding and watering of their crops during the growing season. Adequate supplies of food and water assist in providing good flavour, weight, colour, and crispness, as well as size.

When lifted roots should be selected carefully and any showing evidence of rots, skin punctures, insect damage, and second growth should be discarded. Any very large ones should also be discarded, as these may be overmature. This applies particularly to beetroot and turnips. Beetroot should be handled with particular care, as the skin is damaged easily.

Several methods will give satisfactory storage of root crops, but whatever one is used roots (with the exception of parsnips) should be stored as soon as possible after lifting to avoid deterioration through loss of moisture. A little curing by drying the skin in the air for a short period will assist in conditioning parsnips for storage. They should not be left, however, until the roots begin to wilt.

The tops of all roots should be screwed off, leaving about 3in. of them attached to the roots. Tops should not be cut close to flesh, as damage and subsequent rots of roots may occur.

Roots may be stored in boxes, pits, or clamps.

Boxes: Perhaps the easiest and simplest method of storing roots is to place them in layers in a box, using alternate layers of roots and moist sand, sifted ashes, soil, peat, or moss. The box should be sturdy and should be stored in a cool, well-drained position sheltered from the weather.

Pits: Holes are dug in the soil and lined with sacks, straw, or boxing. Pits should be dug on the highest and driest portion of the garden so that they do not collect water during winter. When pits are used it is sufficient to place the roots (upright in the case of carrots and parsnips) without any filling of sand or other material. The whole can be topped off with straw, then sacking, and finally a layer of soil to prevent drying out. Pits are unsuitable for districts with a high winter rainfall.

An unusual but very effective type of "pit" can be constructed on the surface of the soil by using a barrel or box. An open barrel (a box with one end removed is a good substitute) is laid on its side in a sheltered position in the garden and lined with straw or clean sacking on to which the roots can be stacked. An outer covering of straw and soil is advisable, as this will tend to retain moist conditions within the barrel. A front curtain of straw and sacking or similar materials should be fixed to give protection from the weather and keep the interior cool. The barrel method would be suitable for districts experiencing very wet or frosty conditions during winter.

Clamps: Although clamps are regarded by some gardeners as novel and unnecessary, they can be an effective means of holding root crops for considerable periods. Clamps can be built to any size, but methods of construction are similar in all cases. They should be built on a high spot in the garden so that water does not affect the roots during winter. A thick foundation of sand, sifted ashes, or other suitable material should be laid first. Next a layer of roots should be placed in position with the crowns facing outward. A layer of the foundation material should then be used to fill the gaps and cover the roots slightly. Laying and covering can be repeated until all the roots are in position. If the foundation is built in the form of a circle and each layer of roots is made progressively smaller in diameter, a conical clamp will result. This design when covered will tend to shed winter rains.

After the roots are in position they should be covered with a layer of the foundation material. Ventilation is essential and if it is insufficient, the roots will become more susceptible to rots in the restricted atmosphere. Ventilation can be provided by inserting a "cylinder" of straw or hay into the top of the clamp in such a way that air reaches the top layer of roots. To make the clamp weather tight it should be covered with straw and finally with a layer of soil well patted down. A small drain around the clamp will carry away excess water from the roots.

All roots store best in a moderately moist atmosphere and cool temperatures. Excess moisture and high temperatures tend to encourage shrivelling and disease. As very little of the outer portion of roots is removed when they are prepared for the table, fungicides should not be applied to roots.

Ideal storage conditions for root crops are: Temperature, 34 to 36 degrees F.; relative humidity, 90 to 95 per cent.

Storing Tubers

Potatoes

Potatoes are the staple vegetable in New Zealand and therefore should be grown, harvested, and stored carefully. Thorough ripening is essential to good storage quality; therefore tubers to be stored should not be lifted until mature. Though they can remain in the soil safely for some weeks even after the haulms die down, consideration must be given to possibility of attack by diseases and pests, including the tuber moth, and of their starting into second growth as a result of autumn rains.

Tubers should not be lifted before the haulms begin to turn from green to yellow and brown. While haulms are still green the plants are growing and the tubers probably developing. Digging should be carried out carefully, and if it is started early in the day, tubers will have a chance to dry out before nightfall. It is best not to leave them out overnight, but if the weather is favourable but not too hot and the tuber moth is not prevalent, tubers can be left for a day or two on the surface, as this will assist in hardening them off.

Only dry and sound tubers should be set aside for storage, for which boxes, sacks, pits, or clamps can be used. Boxes are usually more satisfactory than sacks for the home gardener, as the tubers are protected from outside injury and the boxes can be stacked more conveniently. However, if sacks are used, smaller types such as sugar bags are best.

Pits and clamps are suitable for large quantities of tubers. If pits or clamps are built in a sheltered, well-drained position, they are quite satisfactory. Pits can be constructed in a manner similar to those recommended for root crops. Clamps are usually built in the form of an inverted V on the soil surface, but should not be too wide, as ventilation may be impaired. A thick layer of straw should first be laid on the ground and a similar layer used to cover the tubers. A final coating of soil can be applied, but it is advisable to delay this until the tubers cool off, because otherwise overheating and sweating may result. If soil is applied, some means of ventilation is required, the best arrangement being straw cylinders or pipes built into the clamp so that they protrude about half way up one side. Pipe openings should be made weather proof. A trench dug around the clamp will prevent excess surface water from entering.

Deterioration during storage results from too high a storage temperature, the admission of light, excess moisture,

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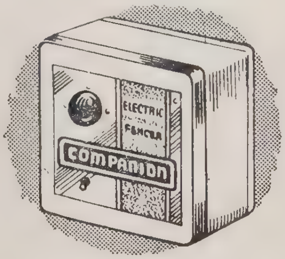

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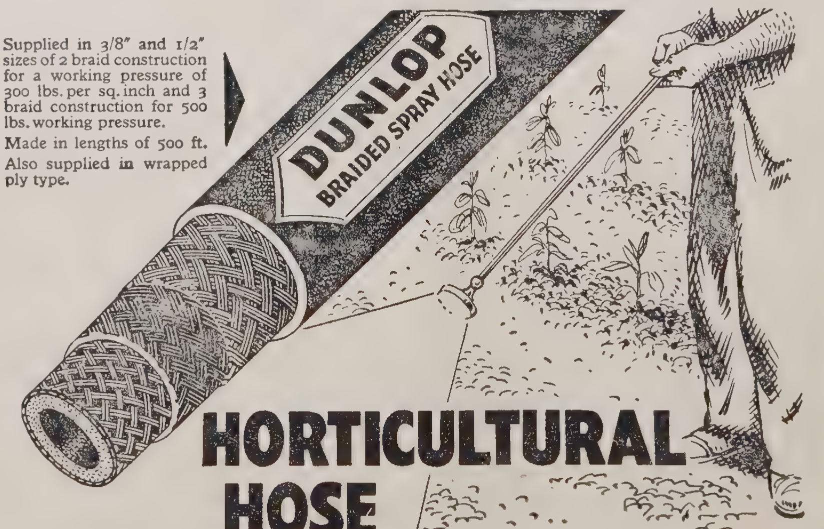

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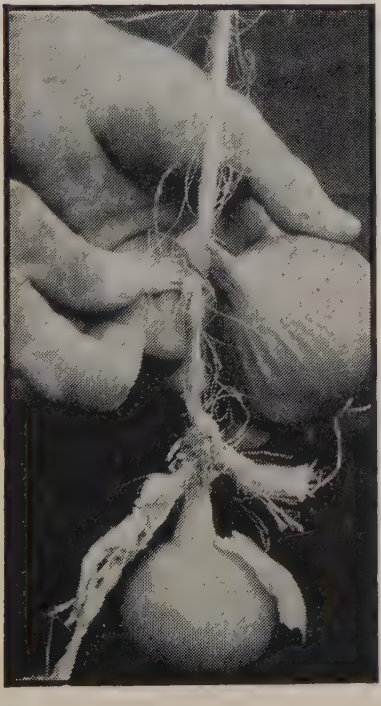
diseased and damaged tubers, bad ventilation, or vermin. Regular inspections during storage are advisable to guard against loss from any of these causes. Clamps cannot be dismantled easily, but checking for ventilation and vermin attack should be possible. If boxes or sacks are stored in cool, airy conditions, deterioration should be negligible. As little of the tubers is removed in preparation of potatoes for the table, application of a fungicide to tubers that are to be stored cannot be recommended. However, the interior of containers could be sprayed with a weak Bordeaux spray and the outer surfaces of the containers dusted with 2 per cent. D.D.T. powder.

Ideal storage conditions for potatoes are: Temperature, 36 to 40 degress F.; relative humidity, 90 per cent.

Kumaras

The culture of kumaras is confined to a small portion of the Dominion, but some gardeners may grow sufficient to store. During the latter stages of growth the vines should be lifted to prevent rooting. This will tend to check second growth and assist in maturing the tubers. Before the tubers are lifted the vines should be cut off close to the soil.

Digging should begin in fine weather and before there is any danger of frosts. Lifting and handling right through to storage must be done with extreme care, as kumaras are very tender and thus are easily damaged. Curing is very important and with commercial crops is an exacting process. In the home garden the commercial process cannot be followed; however, satisfactory curing can be achieved by leaving the tubers out for several days during warm weather to toughen up. They should be covered at night or during wet weather to prevent rewetting of the skins.

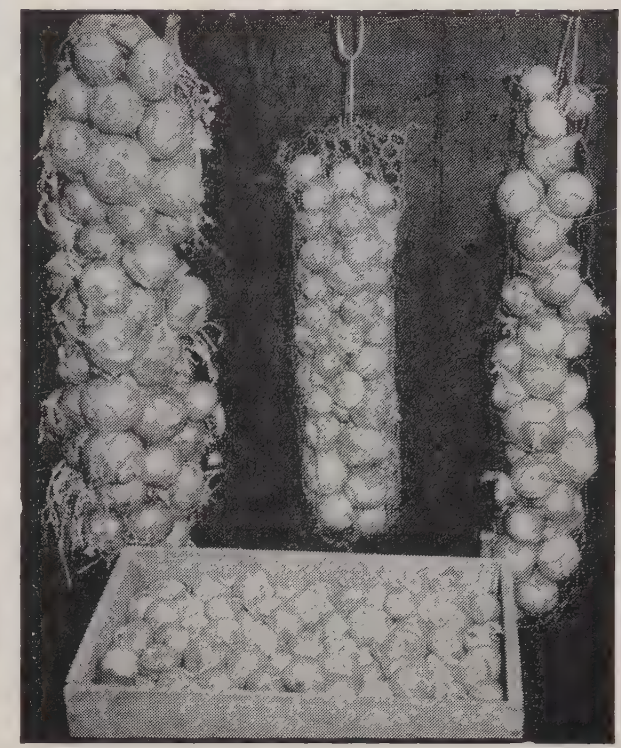


Onions can be strung easily by twisting each stem about a central cord.

Sorting should be done most carefully as the slightest bruise or skin puncture is sufficient to start storage rot.

Kumaras are best stored in boxes of dry sand or sawdust, but whatever method is used, care must be taken to prevent vermin attack. If large quantities are to be stored, they can be put in pits or clamps made in the same manner as for potatoes.

Prevention of rots during storage is difficult unless conditions are ideal. It is even claimed that sorting during the storage period tends to spread disease and not to prevent it. It appears, therefore, that thorough curing and sorting and good storage conditions are the best assurance against disease. For curing, temperatures of 80 to 95 degrees F. are best and relative humidity should be below 70 per cent. Storage conditions are best with temperatures of 50 to 55 degrees F. and relative humidities of 85 to 90 per cent.



Onions can be stored in shallow trays or wire baskets or strung on fine rope. The basket at left and the tray would be suitable for holding shallots also.

Storing Bulbs

Onions

Onions are approaching the harvesting period when the tops begin to change colour and fall over. If the weather is warm and dry, ripening will be fairly rapid and even. However, if conditions encourage uneven and slow ripening, the tops can be bent over. Once the tops have withered the bulbs can be lifted and laid on their sides in windrows to dry. If onions are still firmly rooted, a sharp hoe can be slid beneath the bulbs to cut the roots.

Onions can be dried outdoors if the weather is fine, but if it is unreliable, the bulbs should be moved to a shed and spread out there.

Curing of bulbs is important, as also are good growing conditions. A well-balanced fertiliser including adequate supplies of potash will tend to give onions of good keeping quality. Several turnings during drying will ensure even ripening. When the tops and roots have completely withered and the outer skins are a rich brown and tend to crackle, not unlike egg shells, the bulbs should be ready for storage.

Soft, damaged, diseased, or thick-necked bulbs should be eliminated during sorting. Those with thick necks tend to be poor keepers and often begin to rot inside. Cleaning should be done judiciously and only the leaves and skins which come away most easily should be removed. Removal of skins or leaves that are attached firmly may damage the flesh of the bulb. The loose, brown outer scales tend to guard the bulbs and some authorities consider they absorb excess moisture and thus assist in preventing disease.

Onions can be stored in many ways, but probably that most commonly used is the "string" method. The "string" is made by wrapping the dried stems of each bulb round a central length of fine rope, as shown in the illustration above. If an onion is tied to the bottom of the rope, it will prevent the bulbs from slipping off. (A similar method was illustrated on page 60 of the January 1951 issue of the "Journal".) Onions so strung are easy to inspect during winter and diseased ones can be eliminated without trouble. A novel method of storing is the use of wire-netting baskets. Air circulation is excellent and diseased bulbs can be noticed easily. Wire-netting "shelves" or shallow wooden trays provide alternative means of storage.

Onions should be stored in cool, dry conditions away from direct sunlight and in a position where they are not likely to be injured. Warm, humid conditions encourage rots and should be prevented where possible. During storage bulbs should be inspected frequently and those sprouting, going soft, or showing infection by disease should be discarded immediately.

Ideal storage conditions for onions are: Temperature, 31 to 34 degrees F.; relative humidity, 65 to 75 per cent.

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Shallots

The main points applying to harvesting, curing, and storage of onions apply equally to shallots, except that shallots can be stored more suitably in small, shallow containers where air circulation is not restricted.

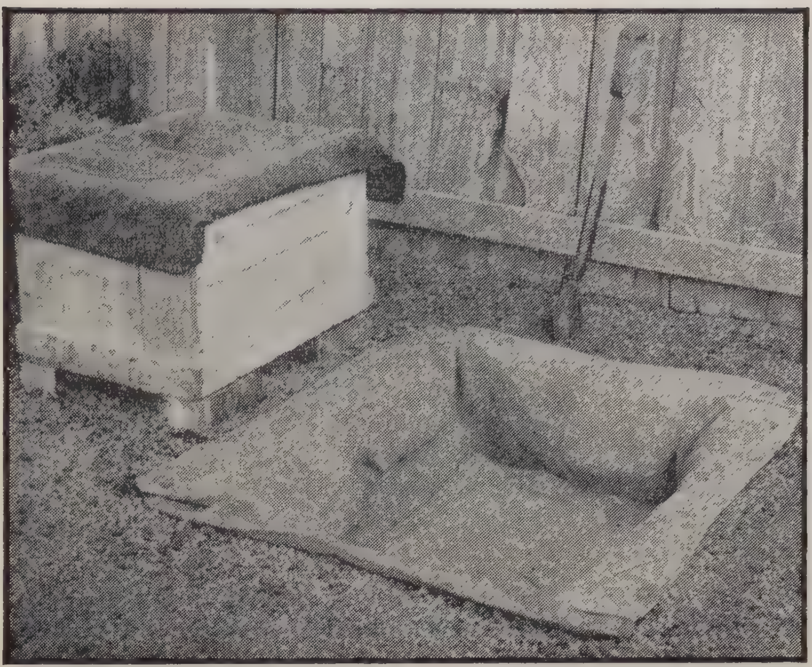
Storing Cucurbits

Cucurbits include pumpkins, squashes, and marrows, the first two being the main kinds stored for winter use. All fruit should be allowed to ripen thoroughly before harvesting is begun. Once the fruits have matured they should be harvested before rains or frosts damage them.

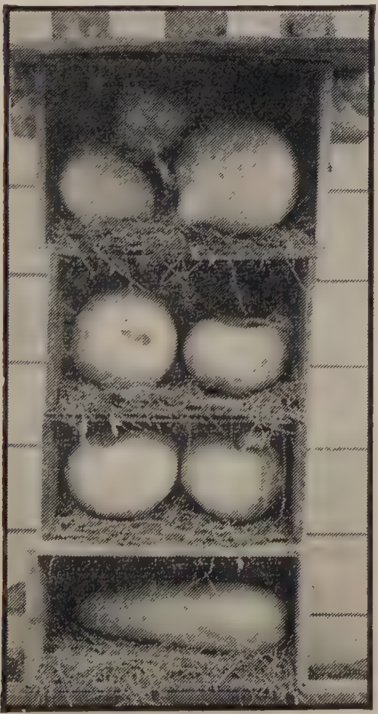
Maturity in pumpkins, squashes, and marrows is partly indicated by the change in colour of the stem from green to brown. The skin also changes colour; marrows change from green to yellow or green with yellow stripes. Squashes usually become brick red and most pumpkins a slate colour. In all instances the skin should be hard and dry and when tapped with the knuckles should give out a dull drumming sound. One suggested test for maturity is to press the thumb nail into the skin, which if fully mature, will not puncture under the pressure, but this is an undesirable test, as a slight puncture may later allow entry of disease organisms.

When harvested cucurbits should be cut from the vines with their complete stems attached. Fruits should be transported to their storage position as carefully as possible to prevent skin damage.

Cucurbits can be stored more successfully under cover than in the open, although many tons of commercial crops are stored outside. However, disease usually takes toll of fruits stored outside and losses are sometimes heavy. Storage is best under high temperature and low relative humidity; that is, in warmth and dryness. Slotted shelves are ideal for storage of cucurbits; they can often be erected on one wall of the tool shed. Small quantities can be stored in boxes, except that with marrows it is not advisable to place too many in the one container. Pressure from above may result in damage to lower fruits. In the "Journal" for October 1951 excellent methods for storing cucurbits in large quantities in the field were illustrated. In districts with comparatively mild winters similar methods can be used in the home garden by piling boxes on their sides in the shelter of a hedge, fence, or trees. A covering of waterproof material will prevent rain from falling on the fruits.



Left—Suitable boxes make good containers in which to pack root crops in sand. Right—Pits lined with sacks or straw are suitable if soil conditions are not too wet. All vegetables should be stored in positions easily accessible to the housewife.



These pumpkins and marrows, photographed in November, stored well in a variety of boxes topped off with corrugated iron to keep out rain.

If cucurbits are matured, sorted, and stored correctly, storage rots should not be serious. However, growing conditions and the weather during storage both govern to some extent the keeping quality of the fruits. Cucurbits are one kind of vegetable that can be treated with a fungicide to help prevent storage rots. Complete fruits can be dipped in a weak Bordeaux mixture and then thoroughly dried before storing. After dipping a final check should be made for evidence of skin injury or any other blemish that might invite decay.

Ideal storage conditions for cucurbits are: Temperature, 45 to 55 degrees F.; relative humidity, 65 to 70 per cent.

Storing Seeds

The only seeds usually stored and later used as winter vegetables are peas and beans. All varieties can be dried and stored, but in many cases they are not very appetising when prepared for consumption. Varieties of beans which store well and make a good standby for the winter are: Black Prince (Black Valentine), White Dutch, and Case Knife. These are commonly termed haricot beans.

Peas can also be dried and stored to provide nutritious meals when fresh varieties are scarce. The marrowfat types are the most suitable and include Imperial Blue, Mammoth Blue, and Harrisons Glory.

Both beans and peas should be matured and harvested as suggested in last month's notes on seed saving. The seeds can then be stored successfully in sterilised and perfectly dry preserving jars.

Storing Herbs

Most gardens have a bush or two of culinary herbs. If conditions are such that the herbs do not grow during winter, they can be dried and stored for winter use. The four main kinds used by the housewife are mint, sage, thyme, and parsley, all of which can be dried. All foliage collected for drying should be in prime condition—neither old nor very young. Foliage should be collected just before the bushes begin to bloom and when they are not in direct sunshine.

Mint leaves are best plucked from the stems before being dried. If necessary, the foliage can be washed and then sorted, when any dry or damaged leaves can be removed. Drying should be fairly rapid, as this ensures the retention of colour and the essential oils in the leaves. If dried in the oven at a temperature of 90 to 110 degrees F., leaves should take about 1 hour to become crisp. If they are stored in shallow boxes in an airing cupboard, they may take several days, with the added risk of losing their essential oils.

When dry the leaves can be pulverised by rolling them with a rolling pin and rubbing them through a fine kitchen sieve. All coarse material can then be removed. The finished products can be stored, preferably away from the light, in sterilised and perfectly dry bottles.

Reminders for March

In March gardeners should be reaping what they have sown during the past season, and if they have been conscientious and planned their garden they should be reaping well. From now on crops already mentioned in the sections on storage will require attention and others will be planted out for spring production.

Celery: It is not too late to plant out another small lot of celery, but this should be done only where winters are mild. Solid White is perhaps the best variety, but gardeners should not expect such large plants as from earlier-maturing varieties, as Solid White is a smaller type. Earlier plantings of celery should be kept well mulched with farmyard manure or similar organic manure or watered with liquid manure consisting of 1oz. of nitrate of soda or sulphate of ammonia to 4 gallons of water.

Onions: Sowing can begin toward the end of the month in the North Island and beds should be raised to prevent seed and young plants from being damaged later by excess moisture. From seed sown thinly better plants will result.

Carrots: In very favourable localities it is not too late to make another sowing. The stump-rooted types such as Early Horn or Early Krop are the most suitable. Sowing should be made thinly and, if desirable, in raised beds similar to those adopted for brassica and onion seedlings. Any corner will suffice. A surface which is slightly higher than that of surrounding ground will prevent water from lying on the bed during winter.

Sweet corn: Ears should be harvested at the correct (the "milk") stage, as they lose culinary quality fairly quickly if left on the plants later. The milk stage can be judged only by experience, as varieties differ. Ears should be cooked and eaten as soon as possible after harvesting if the full quality is to be enjoyed. In some northern districts where the green vegetable bug is a problem some control may be necessary. A H.E.T.P. preparation (1 part in 400 parts of water) will be found effective, but this spray should not be used within 2 days of harvesting.

As H.E.T.P. can be extremely dangerous to the user, the greatest care should be taken when spraying with it.

Alternatively D.D.T. 50 per cent. wettable powder, ¾oz. to 4 gallons of water, can be used. Under no circumstances should the husks of sweet corn be cooked with the cob if D.D.T. has been applied.

Leeks: This popular winter vegetable should be kept moulded up to encourage formation of well-blanched leaves. If feeding is considered necessary, copious amounts of liquid manure should be applied. Leeks are gross feeders and respond remarkably to adequate supplies of organic manures.

Other work: In northern districts late sowings of spring cabbage can still be made. Earlier-sown plants should be planted in sheltered and well-drained positions.

A further sowing of cauliflowers can be made. Lettuces should be thinned where necessary and kept supplied with liquid manure. Late crops of shallots should be harvested in a manner similar to that for onions.

Peas and beans should be kept picked to extend the season. Surplus beans should be preserved. Silver beet should be planted out in soil enriched with organic matter. In favoured localities an early sowing of broad beans can be made.

Spinach and turnips can be sown on slightly raised beds if local conditions permit satisfactory growth during early winter. Attention should be given to mulching and watering and to the weeding of seedlings sown last month.

Organic matter which is removed from the garden should not be burnt unless it is diseased. It should be dug in or composted.

All plots not required for winter crops should be sown down in green crops.

Celery should be blanched by earthing or boarding it up or by enclosing the stalks in heavy paper.

All photographs by R. W. Orr.

METEOROLOGICAL RECORDS FOR DECEMBER

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum					Maximum fall		
				Maximum	Minimum	Total fall	No. of days of rain	Difference from normal	Amount	Date	
Kerikeri	201	61.0	—1.7	78.8	39.8	3.23	9		2.06	11	231.3
Auckland	160	62.0	—1.7	74.8	48.1	2.09	16	—1.04	0.49	22	204.2
Tauranga	10	59.6	—2.5	78.5	38.1	2.70	17	—0.85	0.62	22	235.4
Ruakura	131	57.4	—3.3	73.3	35.8	3.60	20	+0.42	0.54	3	210.6
Rotorua	969	57.3	—2.7	77.5	35.0	2.95	16	—0.84	0.65	3	223.8
Gisborne	12	61.1	—2.1	82.6	40.2	2.87	11	+0.94	0.96	14	235.5
New Plymouth ..	160	57.5	—2.5	70.4	41.0	3.90	20	—0.53	0.71	11	208.7
Napier	5	61.4	—1.8	82.6	40.2	1.94	14	—0.11	0.78	17	243.3
Kariol	2125	52.0	—3.2	72.0	30.0	6.30	20	+2.21	1.25	16	
Wanganui	72	58.2	—3.2	75.2	44.0	5.17	19	+2.41	0.65	14	201.0
Palmerston North .	110	58.0	—2.4	74.0	38.5	5.65	21	+2.49	0.83	2	169.7
Waingawa	350	57.3	—2.9	74.0	34.5	3.65	21	+1.01	0.69	22	197.6
Wellington	415	57.2	—1.9	69.0	41.4	2.97	17	—0.32	0.67	22	213.8
Nelson	24	58.6	—2.2	75.2	38.9	3.32	12	+0.31	0.64	23	245.9
Blenheim	12	58.3	—3.0	76.8	35.8	4.57	13	+2.87	2.09	14	263.4
Hokitika	12	54.2	—1.9	67.5	36.7	10.19	22	—0.05	1.40	20	183.0
Hanmer Springs ..	1225	54.2	—3.6	77.0	33.2	8.63	17	+4.75	1.91	14	198.2
Christchurch ..	22	56.6	—3.2	80.0	42.2	4.19	16	+1.70	1.08	22	183.1
Ashburton	323	56.1	—3.0	82.2	38.4	3.55	13	+1.58	0.93	3	195.2
Timaru	56	56.5	—2.2	80.0	35.0	3.76	14	+1.14	0.91	22	192.3
Alexandra	520	58.0	—2.3	81.1	39.4	2.06	12	+0.68	0.94	17	199.1
Taieri	80	53.7	—2.3	79.2	36.2	3.17	22	+0.43	0.56	29	129.6
Invercargill ..	32	54.4	—1.2	72.0	39.0	4.51	19	+0.77	0.56	6	151.9

BOOK REVIEW

"New Zealand Trees": J. W. Matthews

"NEW Zealand Trees" is what it claims to be, a guide to the commoner trees of the Dominion, and the author has accomplished the difficult task of providing adequately descriptive matter in non-technical language.

It is curious that certain species have been included and others omitted, but this may be due to the selection having been made with a horticultural bias; for example, *Dracophyllum longifolium* and *Drimys axillaris*, both of very limited natural range, are included, but the two common beeches *Nothofagus solandri* and *N. cliffortioides* are not and no mention is made of *Libocedrus* species. It is a pity, too, that no scale of measurement is given on the illustrations. Nevertheless, the book should provide an attractive introduction to study for those who wish to be able to identify trees and shrubs which are likely to occur in their local bush areas.

—*M.S.*

A. H. and A. W. Reed. 12s. 6d.

CITRUS PESTS AND DISEASES

Bulletin No. 20, "Recognition and Control of Citrus Pests and Diseases in New Zealand", recently issued by the Department of Agriculture, is more comprehensive than the bulletin of the same name published by the Department some years ago.

In addition to the diagnostic table and spray programme featured in the original bulletin the new publication gives detailed descriptions of symptoms of the many pests and diseases which attack citrus trees in New Zealand and of the most effective methods of protecting trees. The bulletin is free and copies can be obtained at the nearest office of the Department.

SHEEP MUST BE DIPPED

In the North Island . . . by 31 March

In the South Island . . . by 30 April

[National Publicity Studios photo.

THE efficiency with which sheep are dipped yearly is by no means the least important aspect of farming for the production of wool, mutton, and lamb. Highly competent though most New Zealand pastoralists may be, there is still room for improvement in this respect, and in this article G. R. Mackintosh, Inspector of Stock, Department of Agriculture, Hamilton, draws attention to the essential requirements in dipping sheep.

THE season has arrived again when every owner of sheep, whether he has large flocks or merely a few sheep on the cow paddocks, is required by law to dip them correctly. This compulsory dipping period begins on 1 January for all owners and ends on 31 March in the North Island and on 30 April in the South Island. The owner who fails to dip his sheep is liable to prosecution, as is the man who does not dip sheep he buys during the same dipping period. However, if for some legitimate reason, such as lack of water, dipping cannot be carried out within the specified period, an owner may safeguard himself by obtaining from an Inspector of Stock a written extension of time.

Incidence of Infestation too High

From many districts each year come reports of affected ewes causing their lambs to become lice infested. Instead of fattening readily, such lambs become unthrifty, their resistance to disease is lowered, and, particularly where the climate favours the growth of intestinal worms and unthriftiness in stock, losses may occur.

The present incidence of infestation by ked (incorrectly but commonly called a tick) and lice is much greater than it should be. This may be the result of failure of many owners to dip their sheep or of sheep bought during the dipping period not being dipped on the erroneous assumption that the previous owner would have dipped them before sale.

Essentials of Dipping

Farmers are recommended to observe the following essential requirements:—

The muster for dipping should be thorough, even to the extent of "straggle" mustering. It is preferable to have mustering complete the day before dipping.

Sheep should not be dipped immediately "off the shears". Time must be allowed for cuts to heal. Dip manufacturers claim that at least 6 weeks' growth of wool is necessary to hold the dipping material long enough to kill not only the adult parasites but the last of the ked pupae or lice nits when these hatch out up to 3 weeks later.

Immediate neighbours should endeavour to dip at about the same time. Carefully isolate the dipped from the undipped sheep. Choose good weather and never dip while rain is falling.

Dag dirty sheep before dipping them to avoid fouling the dip.

Follow the instructions on the dip packet carefully. The correct amount of water in the dip must be known, not guessed. If there is doubt about the capacity of the dip, measure it. One simple method is to empty a 44-gallon drum twice and a 4-gallon bucket three times into the dip, which will show where 100 gallons of water comes to; each time this is done record the level on a measuring stick or, better still, chisel each 100-gallon mark into the side of the dip. Investigation of faulty dipping has often shown that the owner has overestimated the quantity of water his dip holds.

Handle the sheep carefully. Dipping should never be hurried. Give an adequate immersion and push each sheep completely under the water at least twice. Never duck a sheep that is coughing.

When using benzene hexachloride replenish the dip strictly according to the directions on the label. Use the plunger frequently to agitate the wash.

Remove droppings from the draining pen and keep the sump strained and clean. This is neglected far too often.

Do not forget that "scald" may follow the dipping of heated sheep or flushed rams, or when sheep are crowded too tightly in the draining pens, allowed to sweat in a shed after dipping, or exposed to intense sunshine.

Adequate pressure is essential with a spray dip. The motor must be of sufficient horsepower and the pump driven fast enough for the purpose. Sheep and Wool Instructors of the Department of Agriculture are always ready to advise. The sheep must be left in the spraying pen long enough to become completely wet. The best time to dip sheep in a spray dip is about 6 weeks to 2 months after they have been shorn, particularly for lice control. Thorough saturation of a fleece carrying more than 2 months' growth is very difficult. It is wise to dip rams earlier in the season.

All dipping materials on the market in New Zealand have been approved by the Stock Remedies Board, but satisfactory results cannot be expected unless farmers follow exactly the makers' instructions, which also must be approved by the board.

Parasites can be Eliminated

Farmers who have been tempted to carry more sheep than in previous years must remember that clean sheep thrive much better than infested ones. High prices for sheep and wool call for the taking of every care in the dipping of sheep; in the past considerable financial losses were caused by faulty dipping and such losses would be much greater now.

Compulsory dipping of sheep was introduced in New Zealand about the 1870's for the eradication of sheep scab. Its thorough and resolute enforcement in those days eliminated this scourge; there is no reason why the remaining skin parasites should not be eliminated now.

Care of Livestock during March

Contributed by the Animal Research Division

DRYING OFF OF DAIRY COWS

TO dry off a dairy cow simply stop milking her. This is quite safe and effective. Before drying off a cow examine the milk from each quarter in a strip cup. If there is any sign of mastitis, treat each affected quarter with 3 tubes of penicillin at 24-hour intervals, injecting the third tube after the last milking. If a quarter affected with mastitis feels lumpy, it is not likely to return to full production. Unless the cow is a very good producer, she should be culled.

CULLING OF EMPTY COWS

A cow should never be culled for sterility without being examined for pregnancy by a veterinary surgeon. Many cows thought to be empty have proved to be in calf when slaughtered at the works. Presence or absence of heat is not an infallible guide in diagnosing pregnancy. Good producers which are empty may be worth keeping, as about 80 per cent. of such cows hold when mated in the following season.

SLEEPY SICKNESS IN EWES

Sleepy sickness in ewes, which in some seasons causes severe losses in pregnant ewes, is due to a sudden drop in the food supply just before lambing. On many farms the only feasible way of avoiding this is by shutting up pasture in the autumn for grazing by the ewes for 3 weeks before lambing. Short-rotation ryegrass is particularly valuable for this purpose, as it continues to grow during the winter, even in Southland.

LEAD POISONING IN CATTLE

Many cattle die from lead poisoning every year. As the commonest source of lead on the farm is paint, make sure that old paint tins are burnt or buried, and do not allow cows or calves to lick surfaces from which paint is flaking.

BLOWFLY STRIKE IN SHEEP

Blowfly strike is likely to occur in showery autumn weather when the humid conditions do not allow rapid drying of the fleece. Constant supervision is necessary to ensure that all cases are treated in the early stages. Shear the wool so as to leave a clean margin all round the strike. Watch carefully for narrow tracks leading to areas some distance from the original strike. Treat with a good non-irritant dressing and be careful to collect and destroy the maggots, as, if these are allowed to fall to the ground, they are capable of hatching into flies. Jetting with preparations containing D.D.T. or "Gammexane" will protect sheep against blowfly strike for several weeks.

PULPY KIDNEY VACCINATION OF EWES

If losses from pulpy kidney are usually experienced in lambs under 6 weeks of age, they can be prevented only by vaccinating the ewes. If ewes have not been vaccinated in previous years, the first dose should be injected when they are crutched before tupping and another dose should be injected just before lambing. Ewes which have been vaccinated in previous years require only the pre-lambing injection. Vaccination should be done in temporary yards. Syringes should be boiled before use and needles should be kept in methylated spirit and wiped and changed each time the syringe is filled. Vaccination of ewes will not be effective in preventing losses in lambs over 6 weeks of age. Where such losses occur it is necessary to vaccinate the lambs themselves.

[*News-photo Service photo.*

FEED HAY TO CALVES

Calves should have access to good hay at all times. It is particularly valuable after the first autumn rains, and will greatly assist in preventing the severe scouring which sometimes occurs after the grazing of lush, rapidly growing pasture. Make sure that the calves are rotated through the paddocks at intervals of a few days. Set stocking at this time of year is bound to result in scouring, unthriftiness, and some deaths.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during December and for the 5 months ended 31 December 1951, with comparative figures for the same month and 5-monthly period of 1950, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period	Tons Creamery	Tons Whey	Tons Total	% Inc. or dec.	Total tons in store at end of mth.
December 1951 ..	21,738	348	22,086	—	26,255
December 1950 ..	18,104	340	18,444	—	34,309
Inc. or dec. ..	+3,634	+8	+3,642	+19.746	—8,054
For 5 mths. to 31/12/51 ..	89,731	1,462	91,193	—	—
For 5 mths. to 31/12/50 ..	83,989	1,536	85,525	—	—
Inc. or dec. ..	+5,742	—74	+5,668	+6.627	—

CHEESE

Period	Tons White	Tons Coloured	Tons Total	% Inc. or dec.	Total tons in store at end of mth.
December 1951 ..	13,025	260	13,285	—	14,263
December 1950 ..	13,833	84	13,917	—	21,442
Inc. or dec. ..	—808	+176	—632	—4.541	—7,179
For 5 mths. to 31/12/51 ..	46,189	316	46,505	—	—
For 5 mths. to 31/12/50 ..	49,506	1,329	50,835	—	—
Inc. or dec. ..	—3,317	—1,013	—4,330	—8.517	—

If these figures are converted into butterfat equivalent, there is an increase of 3.434 per cent. in butterfat graded for the 5 months as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

Autumn-sown Pastures and Pasture Topdressing

Seasonal Notes by the Extension Division

PLANNED early-autumn pasture management can raise materially late-autumn and early-winter pasture production and thus increase winter carrying capacity. Of first importance is early-autumn phosphatic topdressing, because March and April applications will stimulate May and June grass production. Early-autumn sowing of new pastures on well-worked and consolidated seed-beds will also assist winter and spring feed supplies. Early sowing enables clovers to become well established before winter and allows the first feedings off to be taken before the land becomes wet. Smothering of clover in young pastures with excessive top grass cover usually occurs with late-sown pastures when wet conditions preclude grazing at the correct stage of growth.

AUTUMN TOPDRESSING WITH PHOSPHATES

EXPERIMENTS have shown that the response from water-soluble fertilisers such as superphosphate is greatest about 1 or 2 months after application. Serpentine and lime-reverted superphosphate and probably "super. compound" are somewhat slower acting, however, and to get the maximum benefit from their use, early-autumn topdressing is necessary. If topdressing is delayed until shortly before growth ceases with the onset of winter, pastures topdressed with these slower-acting fertilisers will not be able to respond. As a result extra winter feed will not be produced and the efficiency of the fertilisers may be considerably reduced.

TWO TOPDRESSINGS A YEAR

It has been shown by experiments that the greatest fertiliser response in low-production periods may be obtained by splitting the fertiliser application into two and topdressing in both early autumn and late spring. The autumn topdressing extends growth into the winter low-production period and the spring topdressing is effective in the summer low-production period. Where intensive grassland farming is practised applying two topdressings a year has much to recommend it. With pastures newly sown the preceding autumn an extra spring topdressing will usually result in marked improvement in the sward.

POTASH AND NITROGEN

Where soils are responsive to potash fertilisers spring applications of potash may give better results than autumn. Potash fertilisers are soluble and may be leached out of soils with winter rainfall before the slow-growing pasture can make adequate use of them. This is less likely to occur in spring, when plant growth is active.

As nitrogenous fertilisers act shortly after they are applied, applications should be made at the time growth is required, though little response can be expected if the weather is too severe for plant growth. "Growthy" weather in late autumn and early spring will probably give the best results for producing out-of-season growth with nitrogenous fertilisers.

—*P. B. LYNCH*

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ITALIAN RYEGRASS FOR FEED

IN RECENT YEARS there has been a tendency for farmers to replace Italian ryegrass with short-rotation ryegrass. Where high initial production is required from a relatively short-lived pasture the use of Italian ryegrass is advised. Italian ryegrass is of particular value for the production of autumn, winter, and early-spring feed after early-autumn sowing. In a trial carried out at Marton it was found that in the first 8 months after an autumn sowing Italian ryegrass carried 9 per cent. more stock than did short-rotation ryegrass. Over the whole year, however, short-rotation ryegrass carried 7 per cent. more stock than did the Italian ryegrass. Italian ryegrass is of greatest value in the arable districts of the South Island, where it can be sown in early autumn on stubble ground. In the all-grass farming districts of the North Island short-rotation ryegrass, because of its longer life, is to be preferred to Italian ryegrass. For use in a temporary pasture Italian ryegrass is sown at 30lb. per acre together with 2lb. of white clover or with up to 10lb. of cowgrass or Montgomery red clover.

ITALIAN RYEGRASS FOR SEED

In seed-producing areas Italian ryegrass is often sown with white clover or red clover with the object of securing a crop of Italian ryegrass seed in the first year and a crop of clover seed in the second year. Best yields result from autumn sowings. Spring sowings are seldom satisfactory, as these do not allow the plants to develop fully before seeding.

Under good conditions areas intended for seed may be fed off several times before being closed in early October, but at no time should they be grazed very closely. For whatever purpose Italian ryegrass is sown, only Certified seed should be used. The strain that is now Certified is higher producing and longer lived than the uncertified seed and is a marked improvement on even the Certified seed that was on the market a few years ago.

—*S. H. SAXBY*

* * *

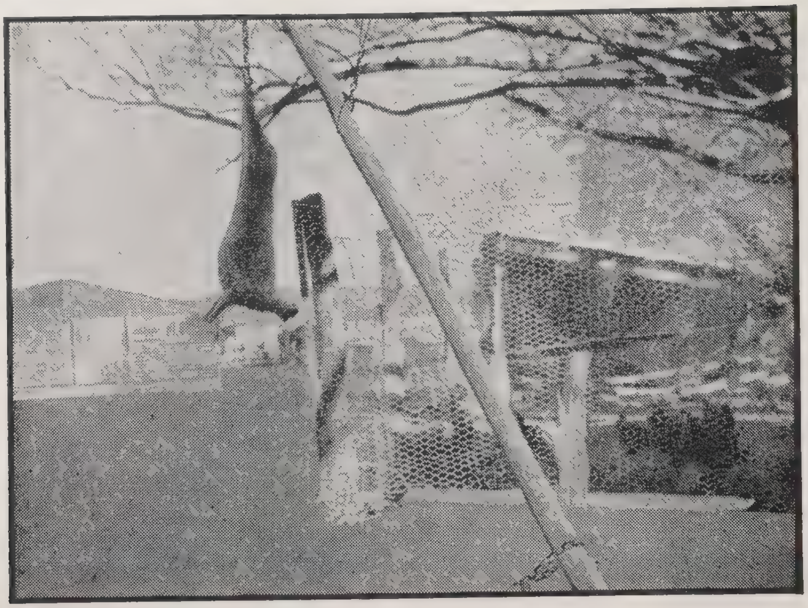
OVERSOWING HILL-COUNTRY PASTURES

THROUGH inferior grasses replacing the better ones which died as soil fertility declined, hill-country pastures have deteriorated in quality and productivity. To some extent cheap bush-burn seed mixtures, unfavourable climate, and incorrect pasture management are also responsible for low carrying capacity. Pasture improvement on steep country should be attempted by oversowing with suitable clovers and by better grazing management. Unless plenty of clover exists in the sward there are economic limitations to phosphate topdressing. Clover is not always easy to establish and experience has shown that many failures result from sowing unsuitable species, depredations by birds, slugs, etc., or close grazing, especially before plants have reseeded.

When oversowing is contemplated the following may serve as a guide: Sow 1lb. of Mt. Barker and 1lb. of Tallarook subterranean clover per acre on well-drained soils that are reasonably fertile or can be topdressed, white clover at 1 to 2lb. on moister soils, and *Lotus major* at ½ to 1lb. on shady faces and on soils that do not dry out unduly. Late-summer or early-autumn seeding is best generally, but in cold regions white clover may be spring sown. On some hill country there will be places to suit all three species and a mixture could be sown with or without fertiliser. The value of annual clovers is often overlooked, but suckling clover (commonly called yellow trefoil) and *Lotus hispidus* (*angustissimus*) are soil and pasture improvers and they might well be sown on hill country. The feeding of hay containing mature clover seeds is one of the best ways to ensure the spread and establishment of clovers.

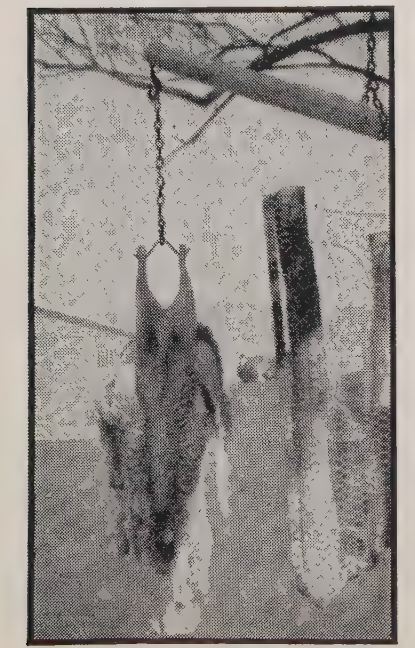
—*E. A. MADDEN*

An Unusual Killing Gallows



THE age-old principle of the lever and fulcrum is put to a novel use on a Sherwood Downs farm in South Canterbury where it is designed for use as a killing gallows.

THE usual killing gallows is made of two uprights and a cross beam from which a block and tackle is suspended, the object of the block and tackle being to reduce the energy needed to raise the sheep carcasses.



The gallows with the carcass in the dressing position.

On the arrangement described here the lever is in its simplest form, consisting of a pole about 12ft. long (any length to suit the farmer's requirements will do), and the fulcrum is a chain hanging from the branch of a tree and attached to the pole about 4ft. from the end from which the carcass will be suspended. In effect it is the simple fulcrum and lever.

To the short end of the pole about 2ft. of chain is attached to hold the gambrel, and on the other end is a chain of a suitable length to hold the pole at the correct height for skinning and dressing the sheep. This chain can be fastened to a hook anchored in the ground.

When the farmer is ready to raise the sheep from the ground the long end of the pole is let up into the air and the chain on the short end hooked on to the gambrel. By pulling down on the long-end chain the farmer can raise the sheep to the correct dressing height with surprisingly little effort. The chain is then fastened to the hook in the ground (or the trunk of a nearby tree if preferred).

When dressing is finished the sheep is raised above the reach of dogs by pulling the long end of the pole right down to the ground and securing it there.

This gallows can be very useful for loading awkward lifts into trailers or lorries when a man is without an assistant, especially as the load can be swung round in a circle and dropped just where required. The arrangement works very efficiently and it is possible to lift a man of average weight to the high position with very little effort.

This equipment seems to be much better than the block, chain, pulley, and rotten rope sometimes seen on farms.

—*H. A. ARTHUR,*
Fields Instructor, Department of Agriculture, Timaru

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Agricultural and Horticultural Correspondence Courses

THE Technical Correspondence School of the Education Department offers a wide range of courses for students who cannot attend classes because of such reasons as distance, hours of work, or ill-health, and for members and ex-members of the armed forces. The courses include subjects directly or indirectly concerned with agriculture and horticulture, as well as covering a large number of trades and technical professions.

The principal courses in agriculture cover dairy and sheep farming and crops and cropping and there are short courses in milk, biology, and concrete.

Horticultural students are catered for up to the standard of the National Diploma of Horticulture in principles of botanical classification, horticulture, surveying, levelling, and drainage. The commercial course is for workers in the market gardening industry and there are short courses in fruit growing, forestry, and practical horticulture.

For servicemen and ex-servicemen only, courses are given in pig farming and farm bookkeeping (five lessons).

Further information may be obtained from the Principal, Technical Correspondence School, 29 Wallace Street, Wellington S.1.

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Radio Broadcasts

RADIO talks will be given to farmers from Station 1YA Auckland at 7.15 p.m. as follows:—

12 March—“Land Improvement”, by P. W. Smallfield, Director, Extension Division, Department of Agriculture, Wellington.

19 March—“Autumn Sowing of Pastures”, by G. L. Banfield, Instructor in Agriculture, Department of Agriculture, Thames.

26 March—“Seasonal Topdressing”, by E. H. Arnold, Assistant Fields Superintendent, Department of Agriculture, Auckland.

The following radio broadcasts to farmers will be given from Station 2YZ Napier at 7 p.m.:—

4 March—“Autumn-sown Pastures and Oversowing”, by R. P. Hill, Fields Instructor, Department of Agriculture, Hastings.

18 March—“Wool Season Report”, by R. G. Montgomery, Sheep and Wool Instructor, Department of Agriculture, Hastings.

Radio broadcasts to farmers will be given as follows from Station 1XH Hamilton at 12.30 p.m.:—

6 March—“Current Disease Problems of Stock”, by P. J. McCann, Veterinarian, Department of Agriculture, Hamilton.

13 March—“Pasture Problems”, by J. R. Murray, Instructor in Agriculture, Department of Agriculture, Hamilton.

20 March—“The Dairy Farm, the Farmer, and his Helpers”, by R. Woolerton, dairy section, Federated Farmers, Hamilton.

27 March—“Home Storage of Fruit and Vegetables”, by C. E. K. Fuller, Orchard Instructor, Department of Agriculture, Hamilton.

Talks will be given from Station 1YZ Rotorua at 7.15 p.m. as follows:—
6 March—“Hygiene in the Milking Shed”, by A. D. Gabolinscy, Special Inspector, Department of Agriculture, Hamilton.
20 March—Y.F.C. talk, by Western Bay of Plenty District Committee.

Radio talks to farmers will be given from Station 3YA Christchurch as follows:—
6 March (at 7.15 p.m.)—Review of “Journal of Agriculture”, by E. G. Smith, Extension Division, Department of Agriculture, Rangiora.
10 March (at 12.20 p.m.)—“Deep Litter”, by J. H. Jones, Assistant Poultry Instructor, Department of Agriculture, Christchurch.
20 March (at 7.15 p.m.)—“The Design and Construction of Sheepyards”, by I. S. Miller, Sheep and Wool Instructor, Department of Agriculture, Christchurch.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 1YD Auckland on Thursdays at 7.30 p.m., 1XN Whangarei on Mondays and Wednesdays at 8.10 p.m., 2XG Gisborne on Tuesdays at 8 p.m.

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Renovation of Pastures in Western Bay of Plenty

By A. V. ALLO, Instructor in Agriculture,
Department of Agriculture, Tauranga

IN western Bay of Plenty, as in most farming districts, there are very few farmers who are completely satisfied with all their grass paddocks. In most cases there are a few really good pastures, normally those nearest the house and cowshed, sometimes a few so hopelessly poor that ploughing is the only remedy, and a number which are not producing as good a sole of grass as the country is capable of carrying. The last mentioned, although providing a fair amount of feed during the season, are at the stage where they are not as good as they should be and yet are too good to warrant ploughing and resowing. There may be a weakness in the clovers or a lack of ryegrass; frequently the trouble is a combination of both these circumstances.

IT is costly today to plough up a paddock and resow it to grass. In addition, on the light pumice soils of the Bay of Plenty consolidation is lost by ploughing and has to be regained before satisfactory pastures can be obtained. This consolidation takes time, and a grass paddock which is ploughed and resown is out of production for a considerable period, if the job is done properly. Because of the disadvantages associated with ploughing and resowing, a number of farmers in the Bay of Plenty have looked for an alternative method of renewing pastures.

Surface Working and Sowing

Over the past few years pasture renovation has become increasingly popular and has given some outstanding results. It is simple and comparatively cheap, and essentially consists of surface working the paddock and then sowing more pasture seed. Before this is done, however, the farmer should ascertain the cause of the deterioration of his pasture and so modify his methods of pasture management that faults will be remedied, otherwise a renovated pasture will revert to low productiveness.

Success is not difficult to obtain providing a few simple rules are followed. Some pastures do not appear to have benefited from this renovation, but this is usually because there has been some deviation from the standard practice or because manurial treatment or management after renovation has been faulty.

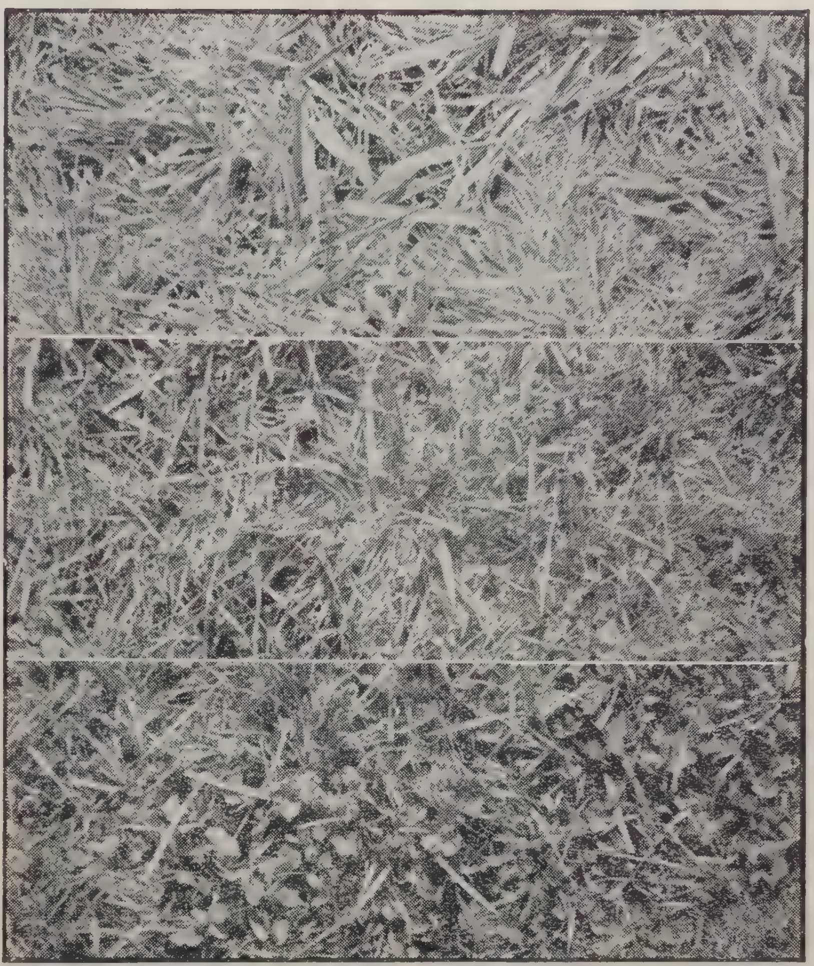
This article has been written to collate the experiences of Bay of Plenty farmers who have tried pasture renovation and to indicate those methods which have given the best results.

Weak or Sodbound Swards

There are two types of pasture on which renovation may be tried. First, there is the paddock which may have been sown with "cheap seeds" or with too light a seeding, which has deteriorated because of lack of adequate fertiliser, or where some other factor has resulted in a rather open and weak sward. Again, on farms with only a few hay paddocks cutting of hay on these pastures year after year has resulted in sward deterioration. In many cases pastures have been allowed to become rank during the flush of spring and early-summer growth with consequent ill effects on the ryegrass and clovers, and lack of chain harrowing on dairy paddocks eventually gives rise to patchy swards containing many weak and open places. Renovation depends simply on the introduction of more grass or more clover seed (usually both) of Certified strains and improvement in management if this has been faulty.

The second type of pasture on which renovation may be tried is paspalum pasture in which the paspalum has become sodbound owing to faulty management. In most cases this is due to either a lowering of fertility through inadequate topdressing or to the practice of allowing the paspalum growth to get rank during summer and autumn. Under these conditions the ryegrass and clovers growing in association with the paspalum slowly but inevitably become smothered out, so that eventually one gets a matted, yellow paspalum sward throwing no winter and spring feed and producing only very low-quality feed during summer and autumn.

Many examples of the two types of pasture described can be seen throughout western Bay of Plenty and most of them can be improved considerably by renovation.



[Rendell's Photo Service photo.

Upper—Poor pasture in the Omokoroa district before renovation. Middle—The same pasture after it had been oversown, without cultivation, with the following mixture: 10lb. of Pedigree perennial ryegrass, 5lb. of short-rotation ryegrass, 2lb. of Pedigree white clover, and 2lb. of crested dogstail, a total of 19lb. per acre. Lower—The same pasture as in the upper illustration oversown with the mixture already mentioned after the ground surface had been thoroughly cultivated with discs and harrows.

Work Best Done in Early Autumn

Renovation work is best done in early autumn after the first autumn rains. Several farmers have attempted spring renovation, mostly without success. It seems that competition from the existing species in the renovated pasture is too strong for the young grass and clover seedlings, many of which are smothered. Again, a dry summer or autumn will adversely affect any young grass and clover plants which manage to survive.

Efforts have been made to renovate pasture during dry weather, but in nearly all cases results have been greatly inferior to those obtained on areas treated after autumn rains. On the other hand, it is unwise to wait until very late autumn or early winter, as conditions are then too cold to allow the quick establishment which is essential.

Pastures selected for renovation should be grazed down hard in autumn, first by the dairy herd and then by any dry stock available. If the growth is very rank, it will pay to trim it with the mower before attempting to work up a seed-bed. If available, a mob of sheep and bullocks will do good work in cleaning up a paddock before renovation.

Working up Ground

The next step is to work up the ground to provide a suitable seed-bed. This is best done by using discs or heavy, penetrating harrows, the amount of working required depending on the type of pasture being renovated. If the pasture is thin and run out, with little or no paspalum, two strokes of the heavy harrows usually will suffice unless the soil is very heavy, when more working will be required. If, however, sodbound paspalum is being treated, far more work will be needed to provide a seed-bed, and it is usually necessary to give several cuts with the discs before using the heavy harrows. When sodbound paspalum is being disced it is advisable to set the discs at the third or fourth notch and to weight them. Discs should be clean and sharp. When several strokes are being made with the discs a better seed-bed will be obtained by working on different angles than by following the direction of the first cut.

If there is much rank growth on the paddock, it is most difficult to work up a good seed-bed. Harrows will block continually and discs will ride on litter and will not penetrate properly. It has been found to be almost impossible to work up a satisfactory seed-bed if the soil is very dry and hard during a drought.

As the purpose of renovation is to increase the number of useful plants already in a pasture, it is not necessary or desirable to work up the land to the extent that all the useful species already present are pulled out. Failure to appreciate this has led to some disappointments. Some farmers are apprehensive about the results of working up their ground to the extent which is sufficient; others tear it up with heavy implements until the soil is as loose as if it had been ploughed, and as a result most of the consolidation is lost and conditions unsuitable for satisfactory germination of seed are created. All that is required is to get sufficient soil showing to give a reasonable coverage of the seed sown and to give the young grass and clover seedlings a chance to germinate and make satisfactory growth.

Seed Mixture

Once the soil has been worked up satisfactorily it should be sown with a seed mixture made up to suit the particular circumstances. If the pasture already contains adequate white clover of a good strain and only the ryegrass is weak, the main constituent of the seed mixture should be good Certified perennial ryegrass. If the paddock being treated has good ryegrass but poor clovers, it is often only necessary to sow about 2lb. of Certified white clover to the acre. However, in most cases where renovation is being done both white clover and the ryegrass are weak, and for these conditions the following mixture is recommended.

	lb. per acre
Certified perennial ryegrass ..	10
Certified short-rotation ryegrass	5
Certified white clover	2
Crested dogstail	2
Total	19

The short-rotation ryegrass in the mixture will provide a considerable amount of feed in the winter after sowing down. On light soils, particularly following a dry summer, short-rotation ryegrass may not reappear in the following winter and spring, but it should always be included in case favourable climatic conditions are experienced during the summer following the sowing of the mixture. On moist, fertile soils short-rotation ryegrass is undoubtedly valuable, for on such soils it may become permanent and contribute a quota of winter fodder.

Oversowing of Paspalum Unsuccessful

Some farmers have attempted to get paspalum into their pastures by using the method of renovation already described. This work has been done both in spring and in autumn, nearly always without success. Other farmers have tried surface working of paddocks in late spring and oversowing with paspalum, but in nearly every case results have been disappointing. It is now considered that it is almost impossible to introduce paspalum into pasture by oversowing.

Similarly, rather poor results have been obtained with cocksfoot and timothy in renovation work, so that inclusion generally of these species in seed mixtures is not recommended.

In one or two cases where renovation has failed it has been most difficult to determine the cause. Cultivation of the surface of the ground has been satisfactory and ample seed and manure has been sown. As a final resort a sample of the seed sown has been tested and has been proved to have a very low germination, thus accounting for the poor results.

Farmers should always determine the germination of the seed that they are using, or they may find that a low-germinating line of seed will cause their work to be a failure.

Topdressing

Once the seed is sown the paddock should be topdressed with 3 to 4cwt. of "super. compound" or serpentine superphosphate per acre plus potash where this fertiliser is required. The paddock should then be harrowed with chain harrows and closed up and treated as a paddock of new grass. If freshly renovated pastures are used for the saving of winter grass, the grasses and clovers have every chance to get away and the farmer is sure of having good ryegrass pastures available for his early calvers. It is just as unwise to stock a freshly renovated pasture heavily as it is to overstock a paddock of new grass sown after ploughing, and the spelling during winter that the paddock will get if saved for spring feed will ensure that the ryegrass has every chance of becoming properly established. If, however, the original weakness in the paddock was a shortage of white clover, it is advisable to keep the renovated pasture lightly grazed during winter so that the clover has every chance to become established.

Main Points

It is not difficult to renovate pastures successfully. If the following few simple rules are observed, there is every possibility of a material improvement in the sward.

1. Do the work after the autumn rains.
2. Graze the paddock down as closely as possible.
3. Surface work the ground to an extent sufficient to provide enough soil to give an adequate seed-bed.
4. Sow adequate seedings of Certified seeds of satisfactory germination.
5. Topdress adequately.
6. Treat renovated grass as a paddock of new grass and on no account overstock it during winter.
7. If faulty methods of pasture management have been responsible for pasture deterioration, they should be amended to prevent deterioration recurring.
8. In view of recent experiences it would be wise for a farmer to get advice on the potash status of a paddock before he attempts to renovate it, as many cases of deterioration are due to potash deficiency.

Farmers should not expect too much from renovation. They will not necessarily obtain a pasture as good as they may get by ploughing up and resowing. If, however, the job is done properly, they will materially improve their pastures very much more cheaply than if they had completely resown them and the paddocks will be out of production for a very much shorter time. Sometimes it is far better to plough and resow than to renovate. If the paddock is devoid of useful species or is very weedy, or if the ground surface is so uneven that it is not possible to mow the paddock, it is usually preferable to plough and resow.

There are many farms in the Bay of Plenty on which renovation has given excellent results, and a system of renovating a few paddocks each year on most farms in this district would result in a considerable improvement in pasture quality with consequent increase in production. Renovation by itself will prove useless, however, if faulty methods of pasture management are adopted on the renovated paddock.

Purposes and Benefits of

RESEARCH WORK IN FARM ECONOMICS

THERE is a growing recognition that New Zealand has passed the stage of first, easily won production from the land. Further increases in farm production can and must be achieved, but in achieving them more attention will have to be paid to economy in the use of resources of land, labour, and capital in agriculture, both on individual farms and in New Zealand as a whole. In other words, the economic or business aspects of farm management must be studied side by side with agricultural extension work. The Rural Economics Section of the Department of Agriculture is developing a programme of research into farm economics and farm management in certain areas. The results are arousing such interest among the farmers directly concerned that this work is likely to be expanded if the specially qualified staff required can be found. The nature of agricultural economics research and the long-range objectives in mind are reviewed in this article by E. M. Ojala, Rural Economist, Department of Agriculture, Wellington.

AGRICULTURAL economics is essentially research work. It aims to reveal the economic facts of agricultural life. Whereas institutions such as universities may properly engage in the pursuit of agricultural economic truth as an end in itself, the agricultural economic research of an administrative department must be designed to produce some practical results in a relatively short time.

It follows that the general objective of agricultural economics work in the Department of Agriculture is to describe systematically the essential economic facts associated with the functioning of the agricultural and pastoral industries of New Zealand with a view to defining the main economic problems and helping to point the way to their solution.

Specific Objectives

The specific objectives must be found in the context of the agricultural policy of the country. Clearly, the aim should be to attain the situation which brings the highest return from the resources of the country over a long period. For New Zealand, with its comparative advantages in livestock production and despite short-run marketing uncertainties, it is difficult to avoid the conclusion that the aim must be steadily to increase the production and export of farm products, and steadily to improve efficiency in farm production, consistent with "fair" returns to producers in a setting of individual freedom.

Therefore the more specific objectives of agricultural economic research are, first, to provide farmers directly, and indirectly through extension workers, with information about the economic aspects of farm production that may help in the organisation, operation, and improvement of farms to secure increased production at minimum cost and at satisfactory levels of farm family and farm worker welfare; and, second, to provide data and economic analyses for guidance in the taking of wider decisions affecting agricultural policy and its execution.

The functions of the Rural Economics Section fall into three main groups:—

Administration: Research, investigation, and secretarial work required in connection with day-to-day decisions on economic issues.

Policy: Long-range economic and marketing studies, statistical services, and costing inquiries.

Production: Economic research related to farm production—the study of systems of farming, farm organisation, farm finance, farm management, and land utilisation. This research is carried out mainly by agricultural economists in the field.

The interest of production economics research lies basically in the effective utilisation of land, labour, and capital on individual farms, but extends logically to include the broader economic and social aspects of the use of these resources within the agriculture of a region and finally of the nation.

The data for research work in production economics are of two main kinds—the results of research in soils, climate, crops, livestock, and farm engineering; and data about farm management collected directly from farmers or agencies serving the farmers.

The research projects undertaken are usually related to particular problems of land use or farm management, mostly local but sometimes national. Within the Department a close association exists between the agricultural economist conducting research and the agricultural instructor imparting advice to farmers.

Types of project being developed are county surveys, land-use studies, farm-management studies, and economic studies of farm mechanisation.

County Surveys

The object of county surveys is to indicate the broad pattern of land use county by county, distinguishing the main areas characterised by a common system of farming and revealing the main problems of each system for more detailed study. This work is done in close collaboration with local Instructors in Agriculture.

Extension of this work to the whole country will lead to delineation of all the main production areas into which New Zealand agriculture should be divided, production areas being defined as areas having broadly similar resources and production opportunities. The main local and national farm production problems will also be revealed for study and solution.

[*National Publicity Studios photo.*

Canterbury light lands, consisting of some half a million acres, offer great scope for more intensive development. By the adoption of the best dry-land farming methods, an extra half-million breeding ewes could be carried on the light land alone.

[V. C. Browne photo

Because of its higher rainfall, the foothills area could be some of the best sheep-farming and lamb-fattening grassland in Canterbury.

Agreement will need to be reached in due course on boundaries that can be fixed for a fairly long period, as the production areas should be used for compiling basic statistics of agriculture and measuring current changes.

Surveys have been completed of Malvern, Franklin, Manukau, Ashley, Waitaki, and Rotorua Counties, and are at present under way in Waikato, Egmont, Levels, Cheviot, and Clutha Counties.

Land-use Studies

An indication of a special set of problems associated with the use under farming of a certain type of land, whether it arises from a county survey or not, will be followed by a concentrated study of the present use under existing farming systems of a selected area of the type of land in question. The study will usually be made only where there is evidence of great potentiality not fully realised, but realisable. The purpose of the project would then be to discover the conditions of organisation and management associated with the most economic use of the land and with high levels of farm income.

The procedure being developed for land use studies is:—

Definition of the type of land to be studied, delineation on the soil-type map of the total area involved, and selection of the area or areas to be surveyed.

Collection from all or a selection of the farmers in the area of data about the organisation and management of their farms and the results of a full season's operations. With the better availability of maps of farm holdings and lists of occupiers it is hoped to be able to adopt random methods of farm selection for the study of larger areas in the near future.

Analysis of data of individual farms to reveal the range of farming results and, if possible, the factors of organisation and management and the levels of family welfare associated with economic land use.

Land-use surveys at present under way concern the Canterbury light lands (Lismore and related soil types), the Canterbury foothills (Opuha, Kakahu, and related soil types), and the South Otago downlands.

Canterbury Light Lands

The light soils of Canterbury, which cover more than 500,000 acres of the plains, offer great scope for more intensive development. Irrigation may be the final answer, but in the meantime the best dry-land farming methods could be adopted more widely.

An economic study of farming on these soils was conducted in Malvern County in 1949. The county has 79 light-land farms, covering 59,271 acres. Management data were obtained by survey from 32 of these farms and complete economic data from 19 farms, covering 22,438 acres. The area is one of mixed arable farming, with emphasis on the production of fat lambs and wool, associated in some cases with the growing of small seeds and a limited amount of cash cropping. No very extensive use is yet made of lime or superphosphate and most sown pastures, with some notable exceptions, have a short productive life.

The survey indicated that current methods of managing this land are most efficient economically when the farm unit is of 700 to 1000 acres. More than half the farms on this land in the county are smaller than 700 acres. The hope of most of these smaller farms would seem to lie in intensification of farming through the establishment of more productive and longer-lived pastures by the use of subterranean clover and of lime and phosphate, in conjunction with a stand of lucerne. These methods would also increase production on the larger holdings.

Average sheep-carrying capacity on the 32 farms surveyed was 1 breeding ewe per acre, but well-developed farms were carrying 2 ewes per acre and securing higher net revenues. These results suggest that by the adoption of the good dry-land farming methods being pioneered by some farmers the carrying capacity of these light lands could be doubled. In other words, Canterbury could run an extra half-million breeding ewes on the light lands alone. This possibility is so significant that it will be explored in further work in other parts of Canterbury, and particular attention will be paid to the economic and farm-management problems to be overcome.

Canterbury Foothills

Soil-type maps show 250,000 acres of foothill soil types in Canterbury, stretching along the base of the hills from Waimate to Oxford. This strip of land has long been a source of financial worry and loss, especially to farmers on small holdings. Because of its higher rainfall this land could be some of the best grassland in Canterbury for specialised sheep farming and lamb fattening.

During 1950 a survey of foothill farming was carried out in South Canterbury. Information was obtained from 56 farms, the purpose being to describe the present methods of using this type of land and observe the results, to assess the potentialities, and to study the economic and farm-management problems still to be faced in the further development of Canterbury foothill farming. Results of this survey will be published shortly.

South Otago Downlands

A considerable area of rolling country in the Clutha region is somewhat similar in character to the Canterbury foothills. Possibilities of pastoral production from these downlands are not yet fully known, but their potentiality appears to be great and will be examined this year, along with the difficulties and costs of development.

The significance of land-use surveys of these regions can be seen when they are viewed against a background of the recent farming history of the South Island. The livestock-carrying capacity of Canterbury Land District and of Otago is the same now as it was 20 years ago. Increases in numbers of stock carried on the lowlands have no doubt offset declines on the high country. In the belief that these regions can make a big contribution toward increasing farm production in the South Island under reasonable economic conditions, it is intended to focus land-use research on them during the next few years.

Farm-management Studies

Except that attention is focused on systems of farming rather than on certain soil types or groups of soil types, farm-management studies do not differ greatly from land-use studies. Intensive Waikato dairy farming is a good example of a system in which the main problems are related not to any one soil type, but rather to the particular objectives of the management system.

Farm management is the combining of units of land, labour, livestock, equipment, and additional working capital to secure a desired result, usually a satisfactory net income. The presence of a special farm-management problem is usually indicated by unsatisfactory net farm incomes over a relatively long period under a particular set of farming conditions. In the worst cases soil fertility may be declining steadily, leading in low-price periods to bankruptcy of farmers and abandonment of farms.

The aim of farm-management research is to reveal the problem if one exists. In the general case the aim is to discover the combination of productive factors which will produce most regularly the desired result of management, whether it be a high net income or maximum economic production from the land.

The procedure is to collect the information from a sample of the farmers concerned and subject the data to analysis. The systems of farming which are being studied first are North Island hill sheep farming, Waikato dairy farming, and sheep farming under irrigation in Canterbury.

North Island Hill Sheep Farming

It has long been known that the carrying capacity of hill land is not showing much advance and in some areas is declining. Improvement in some districts is being offset by deterioration elsewhere. About 11 million acres are estimated to be involved in the North Island, covering a wide range of topography, soils, and climate. If the sheep industry is to expand, great significance attaches to the possibility of stimulating a progressive phase in hill-country development.

In the belief that economic problems were a basic factor, economic investigations were initiated. A beginning has been made in Akitio County, which was chosen as representative of large areas of the drier hill country on the east coast of the North Island. Very good co-operation was given by the farmers of the county, all of whom were visited. The results of this survey were published recently by the Department of Agriculture as Bulletin No. 339, "Developing Marginal Lands".

One of the most significant features revealed was the poor economy (in the 1948-49 season) of the sheep farms smaller than 800 acres and particularly those smaller than 500 acres. They yielded relatively low incomes to their operators in that season, they tended to be heavily mortgaged, and on the average were inefficient as business units under the prevailing methods of management. In the 1948-49 season these smaller farms would not have provided on the average any surplus out of current income for investment in farm improvement if cash expenditure had been incurred to offset depreciation and to give a reasonable living standard.

As most Akitio County sheep farms are smaller than 800 acres, the economic information obtained in the survey helps to explain some other observations made—that only 2 per cent. of the county has ever been cultivated, though 30 per cent. is ploughable or discable; that only 21,000 acres were topdressed in 1949-50, though 167,000 acres were judged suitable for topdressing by distributor or blower; and that only 7 per cent. of the pastures contained subterranean or white clover. Evidence gathered during the survey indicated that the hope for improving the economy of the smaller farms lies in cultivation, topdressing, and pasture improvement to enable more breeding ewes to be carried. It was estimated that by the application of known methods of land development the stock-carrying capacity of the county could be almost doubled

If the sheep industry is to expand, the possibility of stimulating progress in hill-country development is important.

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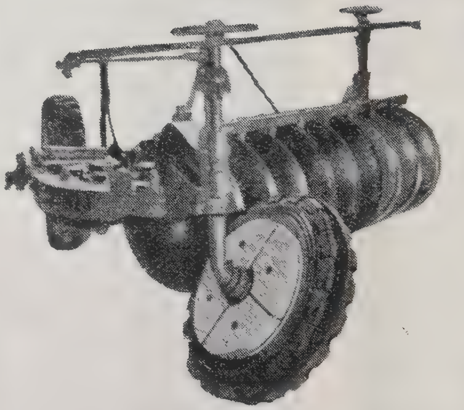

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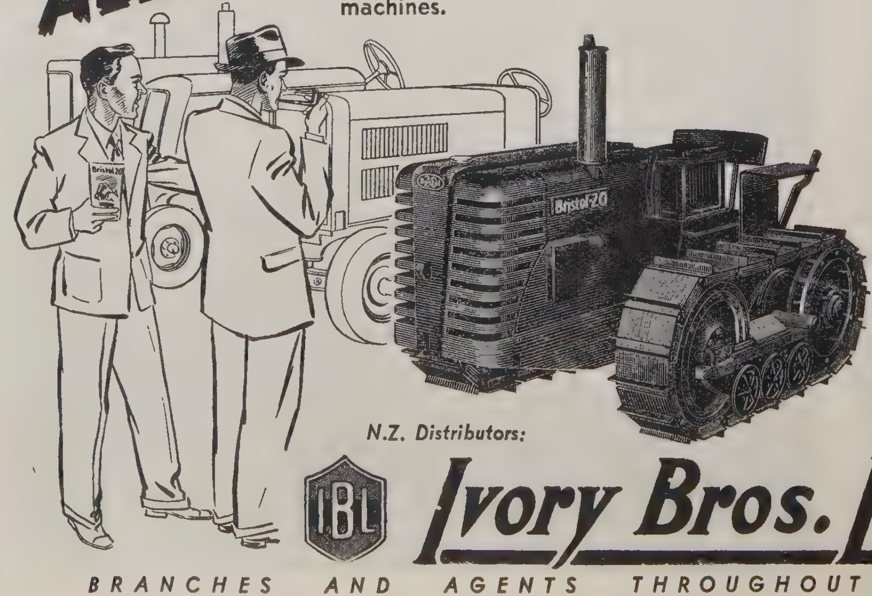

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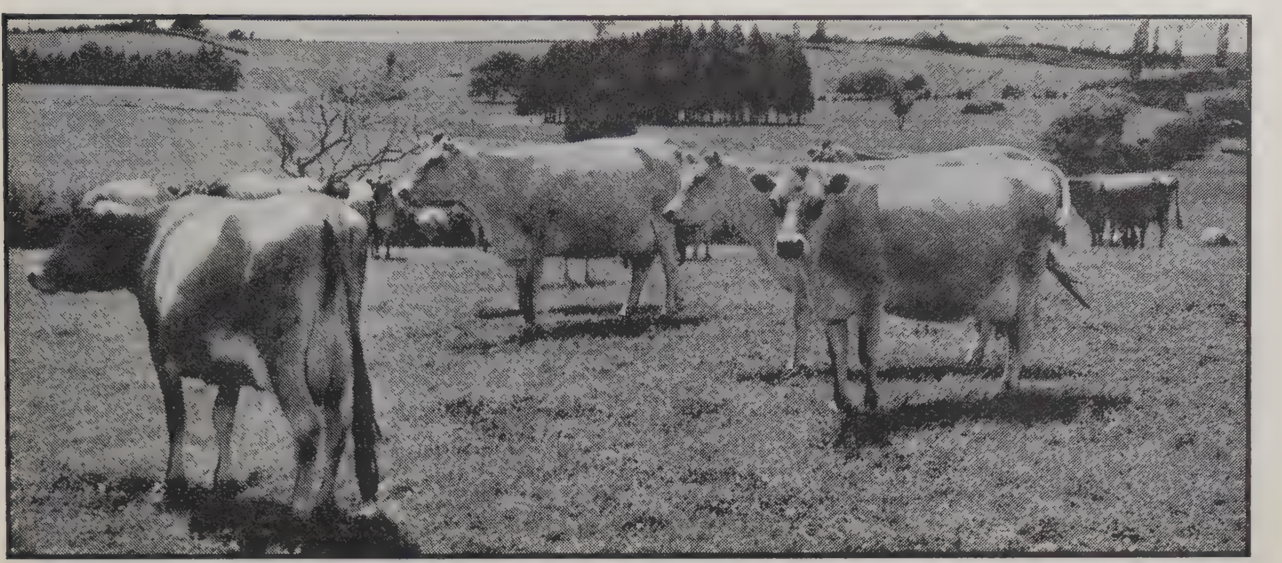

[*National Publicity Studios photo.*

Research has shown that much higher levels of production are possible in the dairy-farming areas of the Waikato.

The main handicaps were the large amount of capital required and local lack of experience in the type of development needed.

The high wool prices of the past two seasons should have given most Akitio farmers a surplus for investment, but in the long run capital for development of the smaller farms will have to be provided from external sources under special conditions. Hope for the provision of capital is centred on the Marginal Lands Board. To give local experience in land development the Department of Agriculture is providing demonstrations of pasture improvement and farm development on two farms in the county, one of 459 acres and one of 609 acres. The economics of this development will be recorded for the benefit of the farming communities interested.

As experience is gained in farm recording of this type studies of the economic structure of North Island hill-country sheep farming and the economics of hill-country improvement will be extended.

Waikato Dairy Farming

Dairy farming in the Waikato basin is generally regarded as a very intensive system of farming. This may be so by overseas standards, but experience at Ruakura Animal Research Station indicates that much higher levels of production are possible on existing dairy farms. If such increases can be achieved economically over a wide range of farms, there is clearly a great reserve of potential dairy production in the Waikato area.

A project was begun last year to seek factual information about the economic aspects of intensifying Waikato dairy farms still further. On the initiative of Federated Farmers' local organisation 13 dairy farmers in three districts of the Waikato made their properties available for development. A programme was worked out for each farm by an Instructor in Agriculture in conjunction with the farmer, who carries out the programme, which is designed within the individual limitations of labour and finance available. The Field Economist records the cost of development and the production and financial changes that follow and will prepare an economic summary annually for each farm to guide further development plans. The first year's recording has proceeded smoothly and the co-operating farmers have received their first reports. Over the 13 farms butterfat production averaged 152lb. per acre in the 1949-50 season and rose to 164lb. per acre in 1950-51, the first year of the scheme. The best increase was achieved by a Paterangi farmer, who raised his butterfat production from 225 to 279lb. per acre. His farm also showed the highest economic efficiency as measured by interest surplus earned per acre.

Similar schemes have been started on a smaller scale in the Manawatu and Wairarapa districts. With the continued co-operation of the farmers it is intended to carry the project on for a number of years, and the results will be more valuable as time passes and as the farming becomes more intensified. The level of production on most of the farms is already relatively high, and the cost of achieving higher levels will be observed with interest. Reports on the results achieved will be made available to the farming community from time to time in collaboration with Federated Farmers.

Irrigation has enabled marked changes to be made in systems of farming, and its adoption on sheep farms has resulted in some fairly spectacular increases in production.

The rapid rate of increase in the number of tractors since 1945 has made it important to examine the economic aspects of tractor operation, especially on the smaller farms. In the 10 years up to 1950 tractors on agricultural and pastoral holdings more than trebled in numbers, increasing from 11,278 to 34,684, and they are now being imported at the rate of 7000 to 8000 per year.

Sheep Farming under Irrigation in Canterbury

In conjunction with the land-use investigation of the Canterbury light land, sheep-farm management under irrigation is being studied. Much of this land is suitable for irrigation and about 9000 acres are at present under irrigation in the Ashburton-Lyndhurst scheme.

During 1950 a project was begun to record the changes in farm organisation, management, production, and economy that accompany the development of irrigation in the Lyndhurst scheme. Forty farmers are co-operating so far, 30 of them on irrigated farms and 10 on adjacent non-irrigated land of the same type.

Information is available for 16 of the 32 farms on which irrigation was started when the scheme began in 1944-45. Six years later, in 1950-51, 20 per cent. of the combined area of these farms was being irrigated on the border-dike system and 6 per cent. by wild flooding. Their cash cropping had been reduced by 60 per cent. and forage cropping by 19 per cent. On the other hand, they had 13 per cent. more land in permanent pasture and 7 times as much in lucerne; the farmers were applying 62 per cent. more lime and harvested an 18 per cent. greater area of small seeds; and the land was carrying 54 per cent. more breeding ewes and 3 times as many hoggets. These averages are fairly spectacular and indicate that a marked change in the system of farming is proceeding under the influence of irrigation. One farmer, with almost half his farm irrigated, is running more than 3 breeding ewes to the acre and development is still going on.

As some of the changes may take place only gradually, it is hoped that the farmers concerned will allow the development of their farms to be recorded for a period of years. In this way factual information will be obtained on the economic aspects of irrigation which should be of great value to the farming community of Canterbury and to the organisations interested in the possible extension of this service.

Farm Mechanisation

In 1940 there were 11,278 tractors on the agricultural and pastoral holdings (1 acre and larger outside boroughs) of New Zealand; only 10 years later the number had grown to 34,684. Most of this extremely rapid rate of increase occurred after 1945. Tractors are now being imported at the rate of 7000 to 8000 per year, nearly all for agricultural purposes. It has therefore become important to examine the economic aspects of tractor operation on New Zealand farms, especially the smaller farms, to provide information for prospective buyers of new tractors.

Tractor-running Costs

An investigation of tractor-running costs has been in progress for a year. Fifty farmers are co-operating with Farm Machinery Officers and Field Economists to provide details of their tractor operations every month. The number is increasing steadily, but many more records are required. The running sheets are analysed and at the end of 12 months the farmer receives an individual report on the fuel consumption, hours worked, and running costs of his tractor during the year.

When enough tractors are being recorded it is intended to compare the economy of operation of different sizes of tractors in use on different sizes and types of farms and to report on the factors associated with good economy in tractor use. Such studies may later be extended to cover other types of mechanical equipment in use on farms.

Making Results Known

As research projects are completed or reach the stage at which valuable conclusions can be drawn the results will be published in "The Journal of Agriculture".

In addition it will be the general practice in all farm-management studies to prepare a standard type of individual report for every co-operating farmer. This report will present his results and the average results for all farms in his group, so he will be able to see in what respects his results are above or below average. A few accompanying notes will convey the comments of the Instructor in Agriculture or the Field Economist on the farm's performance and management. This technique of individual farm reports has already been tried with success in several districts.

Expansion of the Work

The main lines along which research into farm-production economics will be developed have been indicated in this article. Other major or minor projects will be initiated as the demand arises and as staff with the necessary qualifications and interests becomes available.

Expansion of this type of research depends directly on the good will and co-operation of farmers, who have shown willingness to participate in these studies and to take advantage of the results.

Show Dates

THE following are dates and venues of A. and P. shows up to April 14.

1 March—Albany A. and P. at Albany.

1 March—Amuri A. and P. at Rotherham

1 March—Maniototo A. and P. at Ranfurly.

*1 March—Matamata A. and P. at Matamata.

1 March—Mangonui County A. and P. at Kaitaia.

1 March—Temuka and Geraldine A and P. at Winchester.

1 March—Whakatane and Rangitaiki A. and P. at Whakatane.

3 March—Tokoroa A. and P. at Tokoroa.

5 March—Morrinsville A. and P. at Morrinsville.

*8 March—Waikato Central Agricultural Association at Cambridge.

8 March—Kumeu District A. and H. Society at Kumeu.

8 March—Mt. Benger A. and P. at Roxburgh.

11 March—Lake County A. and P. at Arrowtown.

15 March—Hawkes Bay A. and P. (autumn show) at Hastings.

*15 March—Mayfield A. and P. at Mayfield.

15 March—Rotorua A. and P. at Rotorua.

15 March—Upper Clutha A. and P. at Wanaka.

15 March—Wellsford A. and P. at Wellsford

†22 March—Cheviot A. and P. at Cheviot.

*29 March—Hawarden A. and P. at Hawarden

29 March—Waverley at Waverley.

5 April—Oxford A. and P. at Oxford

5 April—Methven A. and P. at Methven.

5 April—Flaxbourne A. and P. at Ward.

14 April—Mackenzie County A. and P. at Fairlie.

14 April—Strath-Taieri A. and P. at Middlemarch.

* The Department of Agriculture exhibit will be staged at this show.

† This show was previously arranged for 15 March.

CARROT CULTURE

By W. G. CRAWFORD, Vegetable Instructor, Department of Agriculture, Oamaru

APART from potatoes, carrots are perhaps the most widely grown vegetable crop for household use. Their ease of preparation as a food, good storage quality, and high nutritional value have greatly popularised this important root crop. The carrot *(Daucus carota)*, which belongs to the *Umbelliferae* or parsley family, is a biennial and succeeds in a wide range of soil types. Carrots do well under cool weather conditions and make a good succession crop. Carrots are recorded as being valuable sources of vitamins A, B, and C, but particularly rich in vitamin A.

CARROTS will grow in a variety of soil types, but if high-quality produce is to be grown, a deep, light, fertile soil should be chosen. Heavy, poorly drained, and shallow soils should be avoided. A sandy loam is preferred for the production of early crops, though for main crops silty loams are best. The soil should be friable, of loose texture, and not subject to caking after heavy rains. This is important, particularly during seed germination. Carrots seldom do well in acid soils, but give good results following a brassica crop for which the ground was limed.

The soil should be thoroughly prepared before the crop is sown; no amount of after cultivation will take the place of good preparation.

Deep cultivation, which allows roots to penetrate and develop normally, is especially important when growing carrots. Deep digging or ploughing, double discing, and harrowing generally bring the soil into a good tilth which is essential for satisfactory yields. After these operations have been carried out levelling the ground with a smooth-faced roller to break lumps on heavy soils and to consolidate light soils completes the initial soil preparation. Care should be taken to see that all lumps of soil are thoroughly broken down as these not only impede seed sowing operations but affect the normal growth of the produce afterward. Autumn ploughing or digging is desirable on all soils, particularly new land being worked for the first time, as the land is greatly benefited by the operation in several ways. The physical condition of heavy soils is improved by exposing them to winter frosts; turf and other organic materials are turned under and allowed to decay; injurious insects are exposed to the weather and birds; and winter rains are able to reach the subsoil. Autumn ploughing also makes the soil easier for working in early spring. Spring ploughing should not be carried out until the soil will crumble in the hand. Clay soils or soils containing much clay should not be worked when too wet or too dry or hard lumps are likely to form, and pulverising by harrows or roller will be difficult.

Fertilisers

The demands on the soil of a carrot crop are heavy and if good yields are to be produced, ample plant nutrients must always be available. Any check in growth is definitely detrimental and early seeding of the crop is likely to occur from this cause. Fresh manure of any kind should not be applied to the soil immediately before sowing seed, as fresh manure causes the carrot roots to fork badly, and such distorted roots are of a low commercial value. Carrots do well on soils heavily manured for a previous crop such as cauliflower or cabbage.

If land is fairly fertile, a mixture of 2 parts of superphosphate, 1 part of blood and bone, ½ part of sulphate of ammonia, and ½ part of sulphate of potash, all by weight, applied at the rate of 2oz. to the square yard or 10 to 15cwt. to the acre, is considered a suitable fertiliser on most soils. Commercial growers apply fertilisers at various times and by various methods, but in the main the bulk of the fertiliser should be applied when the seed is sown, though it should be placed deeper than the seed. A side dressing should be applied after thinning and just before the first cultivation. For early crops a topdressing of nitrate of soda applied at the rate of 1cwt. to the acre has proved beneficial. With main crops excess nitrogen should be avoided, or splitting of the roots may occur and they are then less likely to store well.

HEADING PHOTOGRAPH: Carrots are harvested in the same way as potatoes. National Publicity Studios photo.

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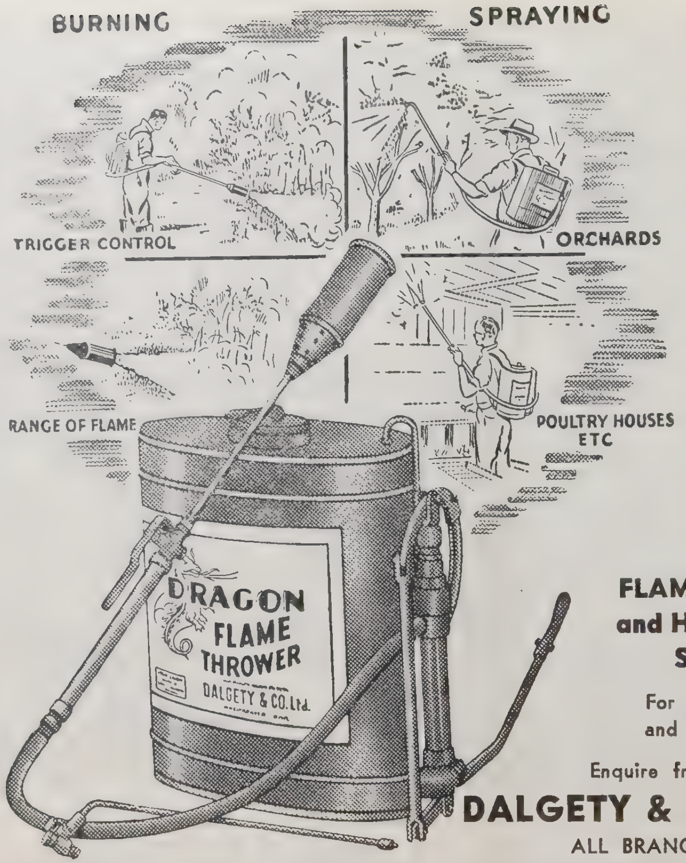

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Varieties

Although many varieties of carrots are grown successfully, commercial production is confined to a few proven varieties. In the main the stump-rooted types are the most popular for bunched carrots, because they are short and easily pulled. Stump-rooted and semi-stump-rooted carrots also do well in heavy soils, where long-rooted types often fail. Long, tapering-rooted varieties are not favoured by commercial growers because of their brittleness and the likelihood of damage occurring during harvesting and transportation to market.

The most popular varieties are Early Krop and Early Horn, for first early; Chantenay for early and main crop; and St. Valery for main crop. Other varieties which have done well over a number of years and which are quite suitable for the home gardener include Manchester Table, James Intermediate, Scarlet Horn, and Guerande.

Seed Sowing

In the home garden seed is usually sown by hand. Early varieties are sown as soon as the ground is in a suitable condition and as early as possible after hard frosts are finished in spring. Often successive sowings of early sorts are made to give a continuity of supplies until main crops come to maturity, generally 2 or 3 months later.

Only small sowings of early varieties should be made, because they tend to go to seed if left in the ground too long.

In the home garden rows of early carrots are usually spaced 10in. to 12in. apart and rows of main-crop carrots 12in. to 14in. apart.

Hand-propelled single-row seeders are used to sow small commercial crops, and for larger areas multiple-row mechanical seeders, which sow from 2 to 5 rows in one operation, are used. The spacing allowed is governed to some extent by the inter-row cultivation equipment used. Usually 10in. to 12in. is sufficient when the crop is sown on the flat.

Where the land is poorly drained, or the soil is shallow and where early crops are required, in districts which have high rainfall or where winter frosts are severe it may be beneficial to plant on ridges. The land is ridged as for potatoes and a double row of seed is sown. This method also facilitates the harvesting of the main crop during winter.

Weed Control

As carrot seedlings are shallow rooting and cannot compete successfully with weeds, cultivation to keep weeds in check during the early stages has an important bearing on yields.

In the home garden hand hoeing is usually practised, but the commercial gardener with a large area uses either a wheel push hoe or a mechanical weeder. Deep cultivation in carrot crops is not desirable and should be avoided. Provided the land is suitable and properly worked before sowing, shallow cultivation to keep weeds in check is all that is necessary. If the ground is clayey, however, or a crust has formed after heavy rains, early breaking of the crust will be beneficial. Once the leaves of the growing crop have spread across the rows inter-row cultivation for weed control should be discontinued, because the leaves may be damaged.

[*Kingham photo.*

Carrot rows one week after being sprayed with kerosene. Note the dead weeds between the rows.

Burning

Compared with many other garden seeds, carrot seed generally is rather slow to germinate and, unless the ground is very free from weed seeds, weeds will emerge before carrot seedlings appear above ground. If weed seedlings can be checked at an early stage, carrot seedlings will be able to come through clean land and get a good start. A weed burner can be employed with excellent results, but great care should be taken to see that the carrot seedlings have not emerged or damage will result. The carrot seed should be examined from time to time to determine the best stage to burn weeds. Burning will virtually replace top hoeing and thus reduces production costs. Weed burning can also be carried out when the ground is wet and top hoeing is not practicable.

Selective Spray for Weed Control

Weed control can also be carried out with the use of specially prepared weed-control kerosene, where it is difficult, because of such factors as wet weather and labour shortages, to control weeds by the ordinary methods. On most gardens weeding must be done at least twice during the season, depending on the type of land and the rainfall. Weeding can become an extensive and costly operation.

Spraying with kerosene, however, will practically eliminate hand or mechanical weeding. The rate of application will depend on the degree of weed infestation, the stage of growth, and the weather conditions at the time of spraying for weed control.

If only the rows of carrots are sprayed and weather and atmospheric conditions are favourable, good results are obtained on moderately weedy ground by using 30 to 40 gallons of kerosene per acre; where conditions are less favourable from 40 to 45 gallons per acre will be required. It is not necessary to spray the whole area, as it is more economical to spray a 4in. to 6in. band along the carrot rows and to leave the centre strip between rows until inter-row cultivation can be carried out either by hand or by machine. Spraying is most effective if carried out when weeds are small, but should not be started until carrots have reached the true-leaf stage. Care should be taken where late spraying is necessary not to spray the crop with kerosene at least 2 months before harvesting, because of the risk of taint.

Thinning

Thinning is an important part of management on most soils. Though crops grown on ridges in sandy soils or loams are seldom thinned, thinning is necessary and beneficial with crops on heavy land. Thinning plants to 2in. to 3in. apart results in well-shaped, uniform roots. For small-growing early varieties, which are usually marketed as bunched carrots, 1½in. or 2in. between plants is quite sufficient; for main crops of larger varieties for table purposes a spacing of up to 4in. is sufficient.

Because small to medium roots are preferred to large, coarse ones, it is desirable to have a fairly thick stand of plants on ridged sandy or rich loamy soils. In the home garden and in small market garden areas, thinning is usually done by hand. In the home garden the first thinning is done when carrots are sufficiently developed to use. With commercial crops it is desirable to thin at an earlier stage.

A small tool used for "gapping" young plants before they are thinned by hand can be made from a piece of 1in. hoop iron 6in. long. The iron is hooked at one end and sharpened on both sides. About 4in. is used for the handle which is completed by riveting pieces of ½in. timber 3in. long on either side of the iron. The implement can also be used for hoeing along the rows.

Harvesting and Marketing

Though harvesting the crop by both home and commercial gardeners in New Zealand is mainly done by hand, some market gardeners use a chain elevator potato digger. The machine has proved very successful for lifting the carrots, but the tops must be removed by hand.

Early-maturing carrots are harvested as soon as the roots are ¾in. to 1in. in diameter at the top. Early carrots are usually bunched; the tops are left on and the roots are tied with raffia or twine. There are usually 6 to 8 carrots in a bunch, depending on the size. Where the crop is to be harvested on a "face" a plough can be used to facilitate the work by running it close to the row and throwing a furrow away from the row of plants. The produce can then be pushed toward the furrow and pulled with ease. Grading the crop is generally carried out in the field during harvesting. Main-crop carrots are seldom sorted into definite grades, although most growers discard those likely to detract from the appearance of their produce. Forked, cracked, very large, very small, and diseased carrots should not be mixed with good-quality produce. The discarded portion of the crop is often sold by producers to rabbiters or farmers.

Disease and Pest Control

Although carrots are not subject to a wide range of diseases, control of diseases and pests is as important as other operations, and considerable losses may occur if prompt action is not taken.

Carrot Rust Fly (*Psila rosae*)

In some of the northern districts of New Zealand, particularly where the soil is light, carrot rust fly is one of the principal pests. In southern districts it is not serious. Symptoms are wilting of the foliage when the plants are young; they subsequently die. Examination of affected roots will reveal at least one small white maggot boring in from the tip of the root upward. In older plants that have established before the crop is attacked small rust-coloured burrowings in which maggots are often found can be seen in the outer layers of the roots. Rot-producing organisms frequently gain entrance through the burrowings and cause extensive decay. The fly, which is about 1/6in. long, appears in spring and lays its eggs in the soil close to the rows of young carrots. The young maggots on hatching enter the carrot at the tip and gradually work upward, destroying the tissue. When the grub has developed fully it returns to the surface to pupate. Although as yet there is no complete control for the pest, naphthalene dust, if applied sufficiently frequently, is a fairly good repellant. On commercial areas naphthalene should be applied at the rate of 300 to 400lb. per acre and in home gardens at the rate of 1½ to 2oz. to every foot of row. Applications should be started after the first thinning of the crop and be continued fortnightly throughout the season. Care should be taken not to continue the treatment to within a month of harvesting, as there may be some residual taint of naphthalene when roots are cooked. All thinnings and infected roots should be destroyed.

Aphis (*Cavariella segopodii*)

During summer the tops of carrots frequently wilt as the result of aphis attack and in cases of severe attack may die. The trouble is worse in hot, dry weather, which favours the development of the pest. The aphides are green or yellowish green and about the size of a pinhead. Aphides can be controlled by spraying with a solution of nicotine sulphate, 1 : 800 parts of water plus 3lb. of soft soap to every 100 gallons.

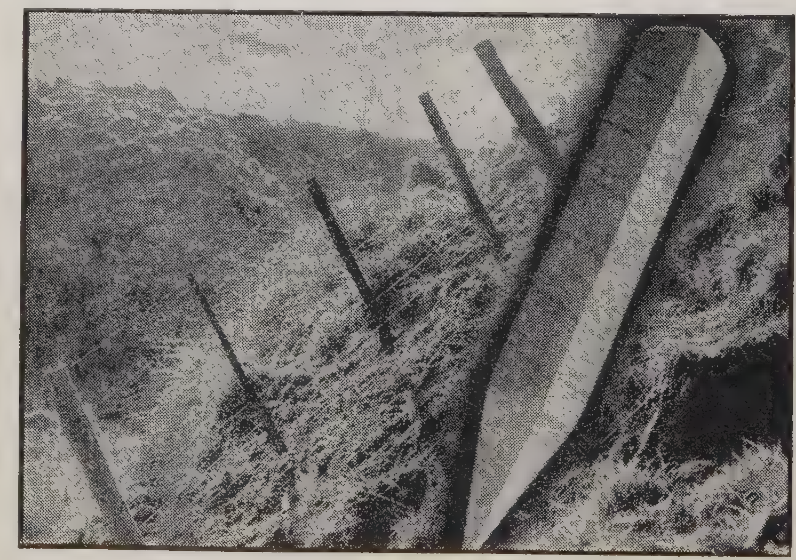
Sclerotinia Rot (*Sclerotinia sclerotiorum*)

Sclerotinia rot is caused by a fungus which also attacks other vegetable crops. The rot usually starts near the crown of the root by direct infection from the soil or from the base of the leaves. As the disease can affect the crop during storage, care should be taken to exclude carrots showing signs of rot before pitting or storing them. Infected plants should be burnt immediately they are seen and all sclerotia should be collected. To reduce the risk of infection allow adequate spacing between rows and keep the soil well cultivated.

Bacterial Soft Rot

In some seasons, particularly in warm districts, soft rot causes serious loss in stored carrots or roots in transit. Soft rot organisms are present in all soils and usually gain entry through wounds arising in cultivation and pulling. The disease can be controlled by dipping roots, as soon as they are pulled or bagged, in a 3 : 4 : 50 Bordeaux mixture or in a copper oxychloride solution (5lb. of copper oxychloride per 100 gallons of water).

Safeguarding Survey Pegs



BECAUSE survey marks are expensive and difficult to replace, farmers and other landholders are urged to avoid destroying or removing them.

Survey pegs should not be taken out of the ground to make way for fencing posts; with care posts can usually be placed without the need for interfering with pegs. A peg in danger of destruction from a plough, mower, or heavy cattle should be driven more deeply into the ground.

The survey marks in general use are 3in. × 2in. or 2½in. × 2½in. totara pegs 21in. long or ½in.- to 1in.-diameter iron spikes or galvanised-iron tubes 18in. long.

Pastures and Farms in Malvern County

IN an article "Farming in Malvern County" ("The New Zealand Journal of Agriculture", October 1949) J. D. Stewart concluded: ". . . Progress in the county may rest on the building up of the lighter areas and in this respect wider use of subterranean clover would appear to be the first requirement . . . ." That fertility can be restored by the use of subterranean clover, lime, and phosphates has been well proved by several farmers in the county. If their methods were adopted more widely on the light lands of Canterbury, the province's sheep population could be greatly increased. Recently the Department of Agriculture carried out two surveys in the county. One was a pasture survey, designed to show where the main types of pastures were to be found. The other was a farm-management survey, designed to show the economic importance of subterranean clover on the light lands.

THE following articles review the findings of the surveys. That on pastures is by S. H. Saxby, Agrostologist, Department of Agriculture, Wellington, and that on farm management by R. C. Stuart, Field Economist, and H. Tocker, Investigating Assistant, both of the Department of Agriculture, Christchurch.

Pastures of Malvern County

COVERING an area of 146,792 acres, Malvern County consists chiefly of plains land, which rises from 200ft. above sea level on its eastern boundary to over 1000ft. above sea level toward the west. Behind the plains is easy to steep hill country, which rises to 2300ft. above sea level.

The soils are mostly shingly, except on the hill country and on the southern banks of the Waimakariri River. The country as a whole was originally covered with a tussock vegetation. The more fertile soils carried silver tussock (*Poa caespitosa*) and the less fertile, leached soils on cold faces carried chiefly hard tussock (*Festuca novae-zelandiae*). Matagauri (*Discaria toumatou*) was a prominent shrub.

Loss of Fertility

Early farming consisted of extensive grazing on both plains and hills, but later large areas of the plains and easy hill country were ploughed and cropped. Pastures on the whole were short lived and were used mainly to spell the land in the cropping rotation.

This continuous cropping over many years resulted in a loss in fertility, and most of the pastures on the plains rapidly reverted to low-producing, cloverless, sodbound swards. On the few fertile valleys where the moisture supply was better permanent, relatively high-producing pastures could be maintained.

On the rolling clay country pastures rapidly reverted to sodbound browntop (*Agrostis tenuis*), and clovers were absent. On the shingle country pastures deteriorated even more rapidly and became dominant "dryland browntop" (*Agrostis tenuis* var.). Hairgrass (*Vulpia dertonensis*), sweet vernal (*Anthoxanthum odoratum*), and catsear (*Hypochaeris radicata*) were abundant.

The only clovers to survive were the annuals suckling clover (*Trifolium dubium*) and haresfoot trefoil (*Trifolium arvense*), the latter being most plentiful on dry areas such as the beds of rivers and streams.

Considerable Improvement

During the last 15 years or so very considerable improvement has been made to pastures in the county, particularly on the lighter land which was carrying dryland browntop pastures. The reason for this improvement has been the introduction of subterranean clover, which, though an annual, is almost permanent because of its ability to re-establish each year from seed set during early summer. On the better country white clover can now be established and maintained and red clover is also satisfactory under lenient grazing.

These changes have been brought about not only by the extended use of these clovers, but by the application of lime, the use of which has increased very rapidly. The following figures

Malvern County consists chiefly of plains land, which rises from 200ft. above sea level on the eastern boundary to over 1000ft. toward the west. Some of the plains land is shown below. V. C. Browne photo.

relating to the delivery of lime by rail to several stations show the changes that have taken place:—

DELIVERIES OF LIME

Station		1935	1940	1945	1950
Kirwee	..	482	765	2,557	5,726
Darfield	..	82	472	1,780	3,116
Sheffield	..	224	526	1,253	2,258
Springfield	..	120	414	820	1,961
Coalgate	..	502	1,504	3,839	8,745

Associated with the increased use of lime, fertilisers, and clovers, there has been an increase in the useful life of grasses such as perennial ryegrass and cocksfoot.

The improvement that has taken place on light land is due almost entirely to the increasing use of subterranean clover.

A survey was carried out recently with the object of determining the extent to which both subterranean clover and white clover are being grown on country that is suitable to each of them. In making the survey the farm rather than the paddock was taken as the unit. For example, farms where subterranean clover was being used successfully were regarded as being subterranean clover farms. Where farms had no subterranean clover or where it was extremely sparse the farm was regarded as being capable of growing subterranean clover but not growing it.

Types of Pasture

The types of pasture recognised in the survey were therefore grouped as follows:—

Tussock.

Permanent pasture with white clover dominant.

Short-term pasture with subterranean clover dominant.

Short-term pasture without subterranean clover on country capable of growing subterranean clover.

Short-term pasture with white clover dominant.

Short-term pasture without white clover on country capable of growing white clover.

The distribution of farms with these types of pastures is shown in the maps on pages 128 and 129.

Tussock: Properties which are covered chiefly by tussock are confined to the unploughable hill country in the western portion of the county near Whitecliffs. Some 41 properties are of this type. As the result of farming, much of the tussock country has been considerably modified, particularly in areas adjacent to cultivated land. The silver and hard tussocks have been reduced in quantity and have been replaced to a varying degree with other plants. Grasses such as browntop, sweet vernal, *Danthonia pilosa*, and, to a small extent, cocksfoot are the most abundant. Gorse is fairly plentiful in some areas, particularly adjacent to cultivated land, where stocking has been heavy enough to damage the tussock association but not heavy enough to control the ingress of the gorse. In localised areas both broom and blackberry are plentiful. Manuka has been fairly common on the lower areas, but much of this is now disappearing as the result of the so-called manuka blight. Throughout the tussock area clovers are very sparse. In the more fertile areas white clover is present as rather unthrifty plants. Suckling clover is more widespread, but is neither abundant nor very productive.

Much of the tussock country, particularly on the higher levels, is relatively free from weeds such as gorse and is in good condition.

Permanent pastures with white clover dominant: These pastures are very limited in extent and are confined to portions of properties in rich valley bottoms such as the Waireka Valley. These permanent pastures consist mainly of vigorous perennial ryegrass and white clover; varying amounts of crested dogstail, cocksfoot, and sweet vernal are also present. Such pastures are present on 9 properties and are used mainly for grazing dairy cattle.

Short-term pastures with subterranean clover dominant: It is on the dry shingle plains, in the vicinity of Burnham and Charing Cross, that the value of subterranean clover is apparent. The survey showed that of 147 properties which could grow subterranean clover 79, or 54 per cent., were doing so. Properties growing subterranean clover are scattered fairly haphazardly throughout the area. This indicates that the introduction of subterranean clover over the whole area is feasible and that its present distribution is related not to soil differences but to the efforts of the occupiers of the properties. As the survey was conducted on a farm rather than on a paddock basis, it shows not the distribution of subterranean clover but the distribution of the properties on which at least several paddocks contain reasonable amounts of subterranean clover.

The composition of the pastures in this group varies very considerably. The best pastures form dense mats dominated by subterranean clover and perennial ryegrass. The older pastures usually contain varying amounts of dryland browntop, hairgrass, and suckling clover. In some pastures the subterranean clover has become so reduced in quantity as to become of little or no importance. In such areas dryland browntop is dominant.

In the better pastures and in wet seasons white clover comes into the sward and contributes a considerable amount of feed. Because of the dry conditions that usually prevail, white clover cannot be relied on and it is necessary to encourage subterranean clover as the necessary legume.

The successful establishment and maintenance of subterranean clover are dependent on two important factors. The first is the raising of the fertility of the land to a sufficiently high level and the second is the adjustment of the grazing management so that the subterranean clover is encouraged to flower and seed each year.

Short-term pastures without subterranean clover growing on country that is capable of growing subterranean clover: The survey showed that of the 147 farms that could grow subterranean clover some 68, or 47 per cent., were not doing so. In some cases subterranean clover was present, but only to a very small extent. The pastures almost invariably consist of dense mats of dryland browntop and varying amounts of hairgrass and sweet vernal. In the younger pastures there are sometimes remnants of ryegrass, cocksfoot, red clover, and white clover.

This type of pasture usually results from the failure to establish subterranean clover. In some cases it has not been sown; in others it has been sown and has failed. In still other cases paddocks have been cropped and not sown down. Such areas rapidly develop into sodbound, low-producing pastures, again dominated by dryland browntop. In these dryland browntop pastures suckling clover is fairly plentiful, but is low in production. Haresfoot trefoil and clustered clover are occasionally present, but are of little value.

Pasture improvement on this country cannot be carried out by topdressing alone. Sometimes attempts are made by topdressing to revive a pasture that is losing its subterranean clover. This is seldom successful and it is usually necessary to plough, take a green crop, and then sow down with a suitable seeds mixture and adequate lime and phosphate.

The tendency to reversion to inferior grasses such as browntop is a feature of all farms in the area where fertility is low or is declining.

Short-term pastures with white clover dominant: These pastures are usually down for only 4 or 5 years and fit in with the cropping rotation. Out of a total of 206 farms that can grow white clover, 184, or over 89 per cent., are doing so. This is not surprising, as white clover has been grown for many years—for so long in fact that it is regarded by some people as a "native" plant. It is one of the most widespread pasture plants and now tends to grow spontaneously on most country to which it is suited.

In Malvern County white clover-dominant and short-term pastures are confined to two main types of land. First there is the rolling clay down country lying between the plains and the foothills, such as the area between Coalgate and Sheffield. Here, because the rainfall is somewhat higher and the soil retains moisture better than on the shingle plains, white clover can be established and maintained. Mixtures sown on this country consist dominantly of perennial ryegrass and white clover. Crested dogstail, cocksfoot, and red clover are also sown as components of mixtures. Much of this country responds to mole drainage, without which it tends to become very wet in winter. To maintain white clover applications of at least 1 ton of lime per acre before sowing down are necessary. Annual dressings of 2 to 3cwt. of phosphatic fertiliser are also necessary. As the result of heavy stocking over a number of years, pastures generally tend to be dominated by crested dogstail and white clover. Perennial ryegrass is present in many pastures in varying amounts, depending largely on the degree to which the fertility has been raised. In the older pastures browntop, sweet vernal, Yorkshire fog, and small amounts of red clover are present.

The second type of land carrying white clover-dominant short-term pastures is the rich soil on the plains. This is mainly between the rolling clay country and the dry shingle plains, as in the vicinity of Darfield. Pastures here are variable, but on the whole are based on white clover. A considerable amount of small seeds is produced on this country. Perennial ryegrass, Italian ryegrass, and red clover are frequently saved for seed and in favourable seasons a considerable quantity of white clover seed is harvested.

Short-term pastures without white clover on country capable of growing white clover: Only 11 per cent. of the farms that can grow white clover are not doing so. These are scattered throughout the area, but are frequently present on country where the fertility has been lowered below the standard required by white clover as the result of cropping. On the plains land the use of subterranean clover for several years would build up the fertility to a state where white clover should be able to grow well. On the rolling clay downs white clover is not growing on some areas that are now dominated by dense swards of browntop. As white clover is growing well on adjoining areas, there is every reason to assume that with adequate lime and fertiliser and with the use of suitable seeds mixtures these browntop areas could be converted into good ryegrass, crested dogstail, and white clover pastures.

The value of subterranean clover is apparent on the dry shingle plains of Malvern County. The farm survey showed that of 147 properties which could grow subterranean clover 79 were growing it.

Farm Management on Light Lands of Malvern County

The data for the farm-management survey by R. C. Stuart, Field Economist, and H. Tocker, Investigating Assistant, both of the Department of Agriculture, Christchurch, were collected in summer 1950 and relate to the period 1 July 1948 to 30 June 1949. Information was obtained by personal visits to the farmers in the area, who co-operated willingly in the survey. Complete management details were obtained from 32 of the 79 properties on the light lands, and financial returns of 19 of the 32 farms were supplied.

The objectives of the survey were:—

1. To describe the present organisation and methods of farming on the Malvern County light lands.
2. To determine the economic results being achieved on the farms.
3. To discover if possible the factors of farm organisation and management associated with good economic results.

Description of the Area

Extent: The light soils of the county, extending from the main south road in the south-east to Kirwee and almost to Darfield in the north, cover about one-third of its total area or about 50,000 acres. This area is typical of at least 500,000 acres of light land in the Canterbury Land District.

Soils: The immature alluvial soils (Lismore series) are the oldest geologically on the plains, having been exposed to the leaching action of percolating rain-water for the longest time. They are low in plant-food content and the lime requirement is greater than on any other soil group in the county. The topsoils are brownish-grey to light greyish-brown shallow silt loams 6 to 8in. deep. The subsoil, which lies over shingle, is yellowish-grey. These soils therefore tend to dry out quickly.

Climate: The average rainfall over a 20-year period for stations near the area is: Darfield, 29.42in.; Burnham, 28.00in. The yearly variations from average rainfall are quite marked, and are of vital importance to the farmers on the light lands. In very dry years the desiccating north-wester, coupled with the inherent droughty nature of the soil and the liability to attacks by both grass-grub and porina (*Oxycanus*) accentuates the difficulties in handling this country. Droughts of 3 to 5 months may be experienced, during which time forage crops sown for winter use commonly fail and pastures are burnt off. The area is subject to strong, cold south-west winds, frosts are experienced throughout the winter, and there is a growthless period of at least 100 days.

Size of farms: The numbers of farms of various sizes are shown in Table 1.

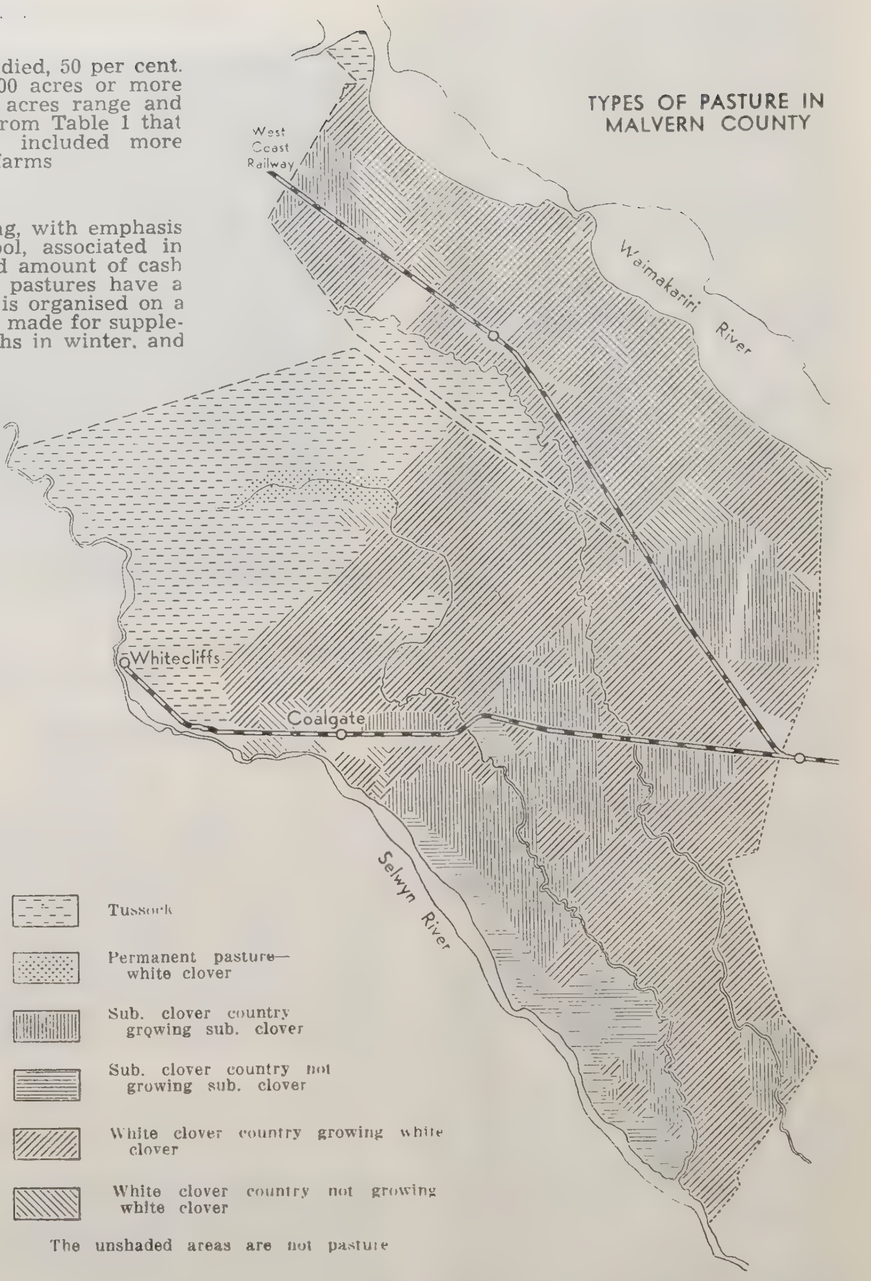
TABLE 1

Farm size acres	All Malvern light-land farms No.	All Malvern light-land farms Total acres	Sample survey of 32 farms No.	Sample survey of 32 farms Acres	Sample survey of 19 farms No.	Sample survey of 19 farms Acres
0–299	17	3,335	—	—	—	—
300–499	21	8,362	5	1,869	4	1,391
500–699	6	3,434	3	1,796	—	—
700–899	16	12,694	8	6,257	6	4,686
900–1099	10	9,742	7	6,755	4	3,841
1100–1299	—	—	—	—	—	—
1300–1499	3	4,104	3	4,104	2	2,720
1500 plus	6	17,600	6	17,600	3	9,800
Total	79	59,271	32	38,381	19	22,438

Of the 79 farm holdings in the area studied, 50 per cent. had less than 500 acres. The farms of 300 acres or more were mainly concentrated in the 300-499 acres range and the 700-899 acres range. It will be seen from Table 1 that the two samples of 32 and 19 farms included more than a proportionate number of larger farms

System of Farming

The area is one of mixed arable farming, with emphasis on the production of fat lambs and wool, associated in some cases with small seeds and a limited amount of cash cropping. Under prevailing management pastures have a short productive life, so that the farming is organised on a basis of short rotations. Provision must be made for supplementary feeding of sheep for 3 to 4 months in winter, and feed is also grown for fattening lambs.



TYPES OF PASTURE IN MALVERN COUNTY

West Coast Railway
Waimakariri River
Whitecliffs
Coalgate
Selwyn River
Tussock
Permanent pasture—white clover
Sub. clover country growing sub. clover
Sub. clover country not growing sub. clover
White clover country growing white clover
White clover country not growing white clover
The unshaded areas are not pasture

Of the 38,381 acres covered by the survey 73 per cent. was in pasture, 17½ per cent. in fodder crops, and 9½ per cent. in cash crops. On individual farms the area in pasture ranged from 55 to 97 per cent., fodder crops from 3 to 32 per cent., and cash crops from nil to 28 per cent. Cash crops grown include wheat, oats, barley, lupins, and peas. Those farmers who have adopted successfully the superior methods of handling this country have reduced their cash cropping to very low proportions, except where the holding is small with relatively high overhead.

The average sheep-carrying capacity on the 32 farms was 1 breeding ewe per acre, but where good methods of pasture management were being practised the carrying capacity reached 2 ewes per acre.

Livestock Management

The ewe flocks were predominantly half-bred or Corriedale, maintained usually by the purchase of 5- and 6-year-olds from the hills or high country, although larger properties often bred their own replacements. There was one Romney flock. On 18 of the 32 farms studied Southdown rams alone were used, but English and Border Leicesters were used as well on the other 14 farms. About half the farmers flushed their ewes before tupping.

From May to August flocks are wintered on turnips, kale, chou moellier, or swedes, supplemented by hay, sheaf oats, or chaff in some cases. Ewes are generally lambed on to greenfeed crops of oats or young grass saved in autumn. No farmer fattened all lambs off the mothers, the average performance being one third, the remainder being finished on rape. When there is a surplus of fattening feed store lambs are bought in for finishing. Cull ewes are fattened, often on second-growth rape, and sold to the freezing works or Addington butchers' market.

The average wool clip was 8½ to 9lb. per head. The average lambing was 96 per cent., with a range of 85 to 110 per cent., and fat lamb weights averaged 36½lb. Malvern County is healthy sheep country, mortality in ewes rarely being above 3 per cent.

Pasture Management

On some of the farms visited the sown pastures revert to browntop after one year, and this tendency to reversion to inferior grasses is a feature of the whole area on farms where fertility is low or declining. The survey revealed that the average productive life of pastures was 3 or 4 years, but a few farmers through improved methods (mainly by the use of subterranean clover, lime, and phosphates), had succeeded in prolonging it to as much as 8 to 10 years. Of the 32 farmers visited, 7 did not sow subterranean clover. Those who did and who practised regular liming and topdressing in addition had much superior pastures.

The seed mixtures, as well as the quality of the seed used, varied considerably. Though there was general recognition of the necessity for sowing good-quality seed, some farmers had endeavoured to economise by using inferior lines. Drilling was the common method of sowing down pastures, usually with rape, kale, or turnips.

There was a general lack of appreciation of the necessity for and advantages of regular liming and topdressing. Although it was usual to sow 1 to 1½cwt. per acre of superphosphate with all crops and new grass, only half the farmers visited topdressed their established pastures regularly. They used 1cwt. of superphosphate per acre. On 26 of the 32 farms studied lime was sown at rates varying from 5cwt. to 1 ton per acre with new pastures, but there was very little liming of established pastures. In the 1948-49 season the total tonnage of lime and phosphates used on the farms surveyed represented averages of only 0.3cwt. of phosphate and 2.3cwt. of lime per acre of the total area.

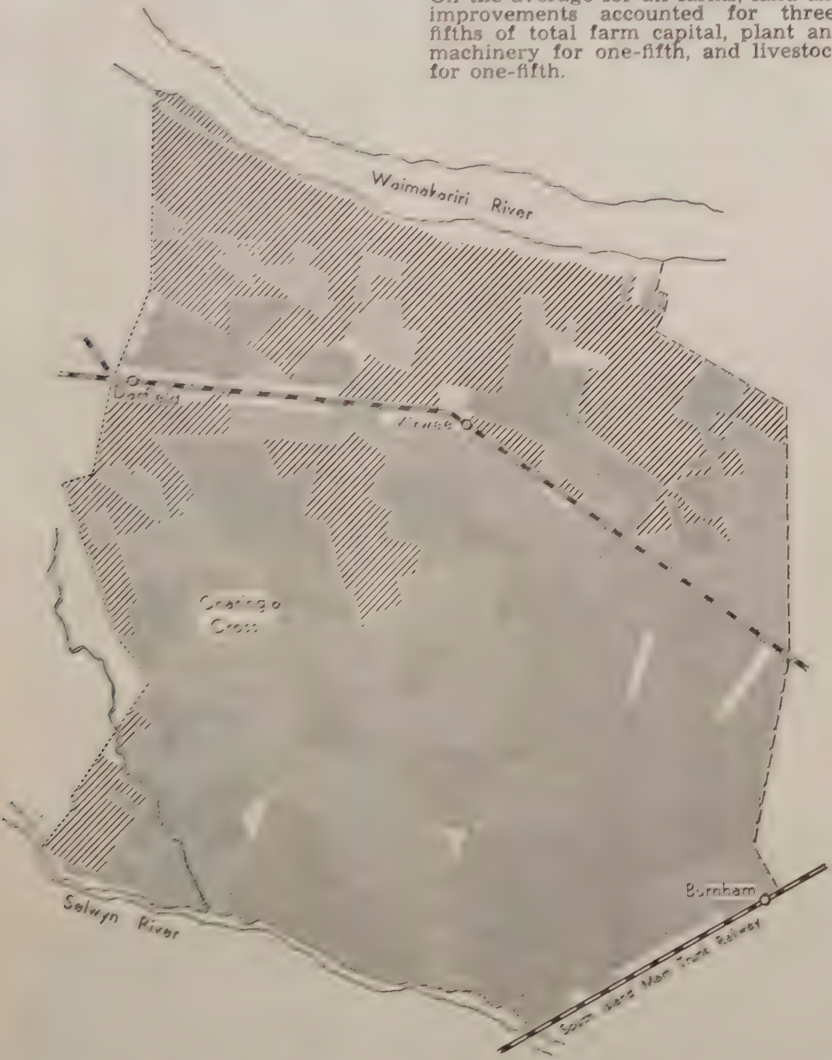
Lack of adequate subdivision was an obvious limiting factor to optimum pasture utilisation on many farms. The 38,381 acres surveyed were divided into 579 paddocks, 243 of which were 50 acres or larger.

TABLE 2—ECONOMIC FEATURES OF MALVERN COUNTY LIGHT-LAND SHEEP FARMS BY SIZE GROUPS 1948–49

Size acres	No. of farms	Average size acres	Average Government capital value per acre £	Total farm capital (average per breeding ewe) £	Averages per farm (£) Gross farm income	Farm working expenses	Interest and management surplus	Allowance for wages of management	Interest surplus	Interest surplus per acre
300–399 ..	4	348	10.1	15.0	1,957	1,318	639	442	197	0.57
700–799 ..	4	728	8.3	12.0	4,378	2,525	1,853	442	1,411	1.94
800–999 ..	5	903	7.3	13.3	4,808	3,394	1,414	442	972	1.08
1,000–1,499 ..	4	1,330	6.0	12.8	4,132	2,832	1,300	442	858	0.65
1,500 and over	2	4,150	4.0	11.3	8,726	5,702	3,024	442	2,582	0.62
Total ..	19									
General average		1,181	6.1	12.5	4,386	2,911	1,475	442	1,033	0.88

Economic Features

All the financial information required was made available for 19 farms. The economic aspects of farm management on the light lands were studied on these farms, which were arranged in 5 size groups. The results are shown in Table 2. They are intended merely to be descriptive of the conditions found on these 19 farms, since the number of farms in each group is too small for detailed analysis of the differences between the groups. A description of the methods used in preparing the table follows.



Farm Capital

Farm capital is the Government valuation of the land and improvements (1942 basis), plus the values of livestock, implements, and machinery at farmers' estimates of fair sale value or market rates current at the time. On the average for all farms, land and improvements accounted for three-fifths of total farm capital, plant and machinery for one-fifth, and livestock for one-fifth.

The Government capital value of the land averaged £6.1 per acre, ranging from £10.1 on 300-399 acre farms to £4 on the largest farms. Total farm capital per breeding ewe averaged £12.5 without much variation by size of farm except that the figure was £15 on the 300-399 acre farms. These results illustrate the relatively heavy capital loading which the smaller farms have to carry and the consequent need for high efficiency in their utilisation of all assets. Generally the machinery and plant on all farms were in good condition.

Gross Farm Income

Gross farm income comprises the receipts from livestock, crops, and other products sold during the 1948-49 year, plus or minus an adjustment for any change in stock on hand between the beginning and end of the year. Such adjustments were very small except on one farm in the third group, where stock were increased by 10 per cent.

As expected in this area sheep products were the major source of income, contributing 77 per cent. of the total for all farms. The proportion ranged from 61 per cent. on farms of 300-399 acres to 83 per cent. for those of 1000-1499 acres.

As farms in the 300-399 acre group were too small to run enough sheep as currently managed to give sufficient income, they relied on cash crops for 35 per cent. of their income on the average, although on 3 of the 4 farms in this group the proportion was nearer 45 per cent. Such income was derived in almost equal proportions from cereal and pulse crops and from small seeds.

In the 700-799 acre and 1000-1499 acre groups 23 per cent. and 16 per cent. respectively of the total income came from cash cropping, mainly small seeds, lupins, peas, and cereals. In the 800-999 acre group, although 24 per cent. of the total income came from cash crops, most of the farmers intended to eliminate cereal cropping and were aiming at a pasture economy with dependence for income on wool and fat lambs and occasionally small seeds.

Gross income per acre is a good comparative measure of the contribution which any piece of farm land makes to the wealth of the nation. For the 19 farms the average gross income per acre was £3.7. On the farms under 1000 acres the gross return averaged £5 to £6 per acre, but there was a sharp fall to £3.1 in the group with 1000-1499 acres.

Working and Maintenance Expenses

Under the heading working and maintenance expenses are included all the routine current expenses involved in operating the farm in 1948-49 and maintaining the farm assets in repair, plus an allowance for depreciation at standard rates. The wages of hired or family labour are included, but no allowance is made at this stage for rewarding the farmer for his own work.

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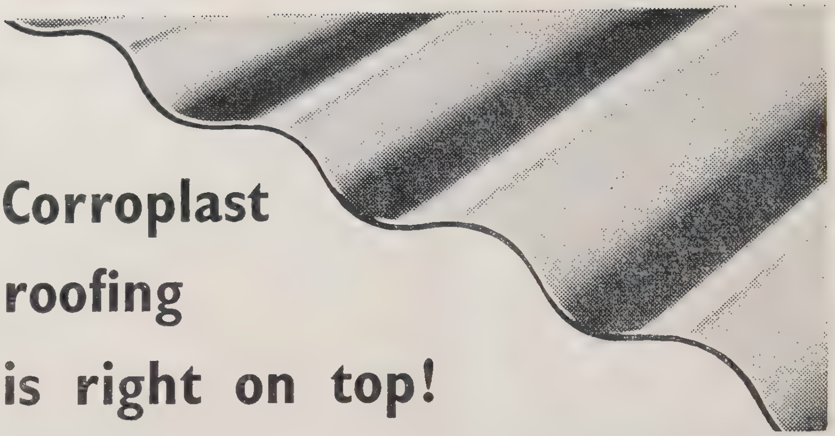

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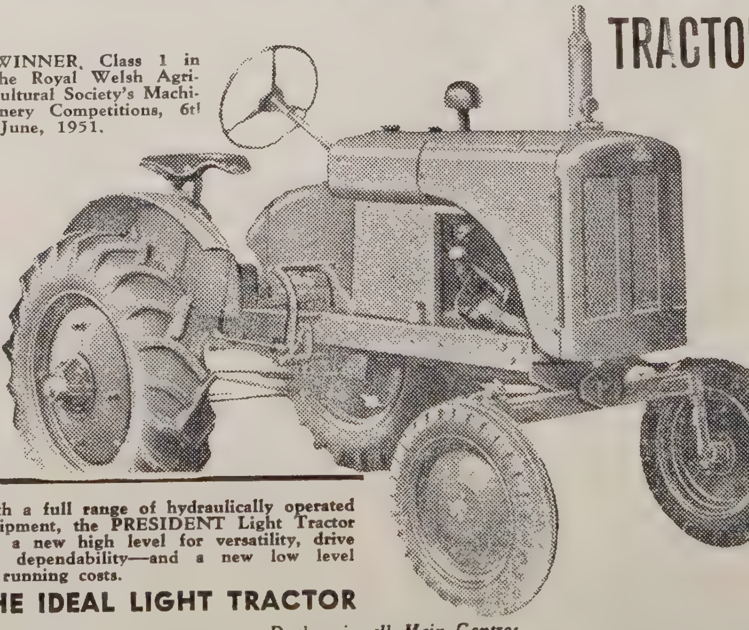

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Most of the farms studied were freehold, but some included leased land. No attempt was made to inquire into the farmers' indebtedness. Because of the variation on these points, it was decided to use a standardised method of analysing the farm accounts, so that comparisons could be made between farms or groups of farms. For this purpose all the farms were regarded as freehold and debt free. Thus payments of interest or rent were excluded from the total of working and maintenance expenses. However, on the assumption that a farm should earn interest on the working capital, a standard allowance was included on all farms, under working expenses, for interest at 4½ per cent. on the value of the stock and chattels.

Fertiliser and seeds are the most important group of items, accounting for 20 per cent. of total working and maintenance expenses on the average for all farms, although on some development farms the proportion was as high as 32 per cent. No doubt on these farms portion of the cost of fertiliser and seed should be considered as capital expenditure, but in the survey it was not found possible to make that distinction with these items. Expenses for tractor, truck, and car averaged 11 per cent. of farm expenditure, with not much variation between groups of farms except that the proportion rose to 13 per cent. on farms in the 300-399 acre group.

Interest and Management Surplus

The interest and management surplus is obtained by deducting the working and maintenance expenses from the gross farm income. As the name suggests, it represents the surplus above operating costs left to reward the farmer's own efforts as a worker and manager and to pay interest on the fixed capital, that is, the land and improvements. Where the farm has no mortgage the interest and management surplus would be the same as the farmer's net income (apart from the interest on stock and chattels allowed under working expenses). Since by the method of analysis used in the table all the farms are regarded as freehold and debt free, the figure for interest and management surplus can be used to compare one farm or group of farms with another.

Allowance for Wages of Management

Allowance for wages of management is the sum allowed as a reward for the farmer's own efforts as a worker. The annual sum of £442 represents £8 10s. per week in cash. In addition the farmer would have various perquisites such as free house, mutton, milk, and firewood, the total value of which was estimated at about £2 per week, so that the total allowance made represents about £10 10s. per week.

Sheep in Malvern County are wintered on supplementary crops such as turnips (shown above), kale, chou moellier, or swedes. Of the 34,000 acres covered by the survey of farms 17½ per cent. were in fodder crops.

The same figure, £442 per year, has been allowed regardless of the size of the farm. This is because the allowance is intended to reward only the farmer's efforts as a worker, not as a manager or businessman.

Interest Surplus

When the allowance for wages of management is deducted from the interest and management surplus the remainder is called the "interest surplus". It will be seen from Table 2 that for the first group of farms, the interest surplus is shown as £197. This means, following the procedure used here, that if on these farms allowances had been made for depreciation at standard rates, interest on stock and chattels at 4½ per cent., and a cash return to the farmer of £8 10s. per week, there would have been an average of £197 left out of the farm income to pay interest on the value of the land and improvements and provide a "bonus" for the farmer. The corresponding results for the other groups of farms are shown in the table.

Since all 19 farms are on the same soil type, the variations in interest surplus per farm are associated with variations in the sizes of farms and the management methods adopted by farmers.

Interest Surplus per Acre

Interest surplus per acre is the result of dividing the interest surplus by the average number of acres per farm in the particular group. Since the soil type is the same for all groups, the figure for interest surplus per acre seems to be the best available single measure of the average business efficiency of the farms in each group.

If Government capital value is acceptable as a fair measure of capital involved in land and improvements, a fair average interest charge per acre can be calculated from Table 2 by taking 4½ per cent. of the capital value per acre shown for each group. The difference between this calculated interest charge per acre and the interest surplus per acre given in the table is an indication of the production "bonus" enjoyed by the farmer as a reward for his management. This "bonus" is greatest in the 700-799 acre and 800-999 acre groups and smallest in the 300-399 acre group.

The number of farms in each group is too small for the differences between groups in interest surplus per acre to be accepted as a basis for studying the effect of size of farm on business efficiency. However, the table does suggest that the current methods of managing the light lands are most efficient economically when the farm unit is 700-1000 acres. The average interest surplus per acre earned on the 4 farms of 300-399 acres in 1948-49 is shown to be well below the average

Half-bred sheep grazing on light land in Malvern County. Ewe flocks in the county are predominantly half-bred or Corriedale. Green and Hahn Photography Ltd. photo.

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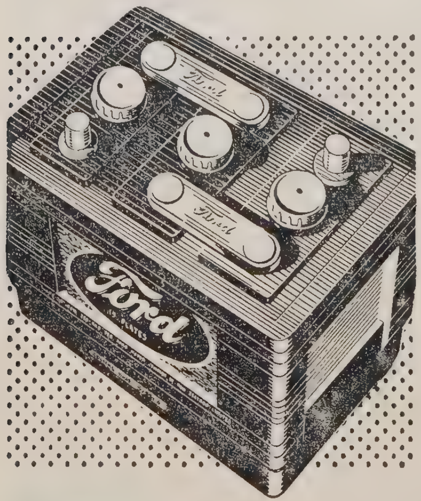

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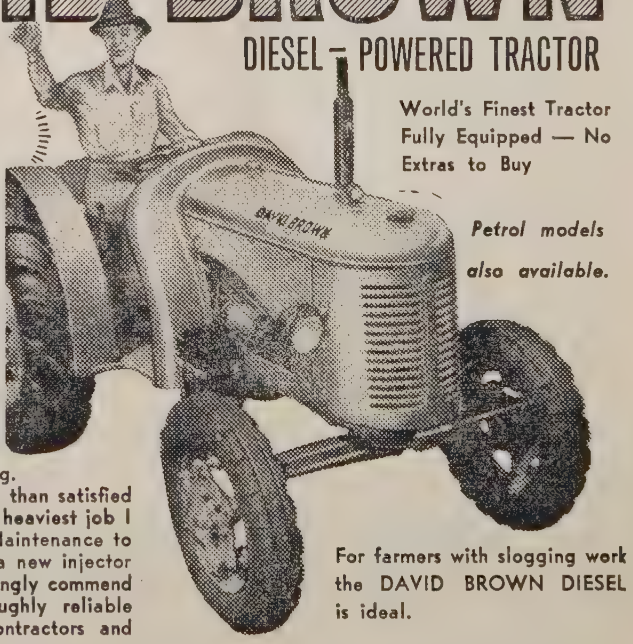

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During the past 15 years pastures in Malvern County have been improved considerably by the application of lime and by greater use of subterranean clover. About 28,000 tons of lime a year are used.

for all 19 farms, and this result highlights the economic difficulties associated with efforts to farm this land in units that are too small.

The significance of this result lies in the fact that half the farms on light land in the Malvern County have less than 700 acres. The possibility of their gaining more land is not known, but the possibility of their carrying more breeding ewes is well established, provided that finance is available for farm development. The hope for most of these smaller farms would seem to lie in intensification of sheep stocking by establishing more productive and longer-lived pastures. The use of subterranean clover, lime, and phosphates appears to be a key factor in pasture improvement on these light lands.

Significance of Subterranean Clover

The pasture map of Malvern County (see pages 128 and 129) indicates that many farmers on the light lands are now making use of subterranean clover, and also that far too many are not using it yet.

One aim of the survey was to investigate if possible the economic significance of subterranean clover; in other words, to discover if its effects in extending the productive life of pastures were reflected in improved financial returns. For this purpose farms which were just beginning to experiment with subterranean clover were ignored and the remaining 13 were divided into two groups: Those where subterranean clover had never been used (group A) and those where subterranean clover had been in use for many years as a central feature of pasture management (group B). A comparison of the average financial results from these two groups of farms in 1948-49 is given in Table 3.

The 7 subterranean clover farms in group A are shown to have yielded an average interest surplus of £1.75 per acre, whereas the 6 no-clover farms averaged £0.34 per acre. This is a striking difference. The average interest surplus earned in group B is barely sufficient to meet a fair interest charge on the capital value of the farms, whereas a considerable "bonus" is available from group A farms to reward the farmers for their superior management.

The better financial position of the group A farms is not due to subterranean clover alone, but it was certainly the intelligent use of this clover which made these superior results possible. The two groups of farms really represent two different systems of farming the light lands.

The farmers of group B do not sow subterranean clover or they mishandle it, and liming and topdressing is not done or is inadequate. The result is common in the county. The sown pastures quickly revert to browntop and hairgrass, which cover most of the farm. On these poor, cloverless pastures sheep-carrying capacity is low and only a few lambs can be fattened off the mothers. Cereal crops are grown in the endeavour to supplement income. These crops further deplete fertility and make the establishment of good pastures more difficult. Some farmers in this position, particularly on the smaller farms, would like to have developed their properties, but until recent years their net incomes have been insufficient to leave much surplus cash for investment in the farm, and there is a general unwillingness to borrow money for development.

On the farms of group A subterranean clover has been sown extensively and the farm management is directed toward making the most effective use of it. Widespread use of lime and phosphates has accompanied the sowing of subterranean clover, and on some farms the fertility has been increased to the stage where white clover can be grown successfully. With more stock being carried lucerne, which has been established on 5 of the 7 farms in this group, forms a valuable source of hay for wintering flocks and is also a welcome addition to grazing in dry periods. A feature of the sheep management on these farms is early lambing to utilise fully the early-spring growth of subterranean clover. The benefit from these methods is reflected in the fact that 4 of the 7 group A farms got over 80 per cent. of their lambs away fat off the mothers, and the other 3 exceeded 60 per cent. The average for all 19 farms was 33 per cent.

With their higher quality pastures producing well for at least 5 years, the group A farms were able to rely almost solely on the returns from sheep products, to the extent of 75 to 80 per cent. of the gross income, the balance usually coming from small seeds. Cereal cropping was eliminated as far as possible.

Model Light-lands Farm

By way of illustration of the lessons of this survey details are given of one farm which may be taken as a model for the efficient farming of Malvern and other light lands of Canterbury. Only 10 years ago the pasture on the farm consisted of browntop and the unit generally was neglected. As the result of a vigorous development programme embracing the widespread use of lime, superphosphate, and subterranean clover, plus lucerne stands for hay and, if needed, for grazing, this property today may be considered a model light-lands farm.

The farm, which is of between 700 and 800 acres, carries 2½ sheep to the acre. Early lambing enables full use to be made of spring growth, and as a result 90 per cent. of the lambs go away fat off the mothers before Christmas almost every year, a rare feat in this district. The farmer seldom buys store lambs for fattening, as he prefers to carry as few stock as possible in the dry summer months in order to spell his pastures at this critical period.

Fertility has been built up by the use of subterranean clover to the stage where red and white clovers are now established easily and the pastures produce a vigorous growth of these clovers for at least 6 years. There are 4 subterranean clover paddocks which are used as a standby.

Pasture Mixtures

The pasture mixture sown is 12½lb. of perennial ryegrass, 4lb. of red clover, and 1lb. of white clover, all certified seed. The method of sowing is to drill the clovers and broadcast the grass, either with chou moellier in November or lupins at the end of January. The

TABLE 3—ECONOMIC FEATURES OF SUBTERRANEAN CLOVER FARMS AND NO-CLOVER FARMS IN MALVERN COUNTY, 1948–49

System of farming	No. of farms	Average size acres	Average Govt. capital value per acre £	Averages per farm (£)					
				Gross farm income	Farm working expenses	Interest and management surplus	Allowance for wages of management	Interest surplus	Interest surplus per acre
A: Subterranean clover ..	7	845	8.1	4,756	2,832	1,924	442	1,482	1.75
B: No clover	6	686	7.0	2,451	1,775	676	442	234	0.34

farmer drills the clovers alone, because grasses tend to smother them, whereas lupins and chou moellier are open plants, and furthermore, the clovers, being in the same drill as the chou moellier, are not trampled so much by sheep. By the broadcasting of the grass the spaces between the drills are filled, which helps to eliminate weeds and conserve moisture.

Topdressing and Liming

The topdressing and liming programme, now that the farm has been fully limed, consists of applying 1 ton of lime per acre before sowing and 1¼cwt. of superphosphate per acre at sowing down, followed by ½ ton of lime and 1cwt. of superphosphate per acre every other year. Subterranean clover is not sown with the pasture mixture mentioned earlier, but volunteer subterranean clover is still evident in most paddocks. New pastures are grazed lightly in the first year to enable clovers to become well established. Clover and grass seed crops are taken occasionally.

A 50-acre stand of lucerne gives ample hay for wintering ewes and also provides light grazing, if needed. A small acreage of chou moellier, lupins, or turnips provides all the fodder crops needed.

The total capital invested is approximately £17 per acre or £9 per ewe. The gross income is over £9 per acre and is derived mainly from wool 33 per cent., sheep and lambs 50 per cent., and small seeds 15 per cent. Total working and maintenance expenses are nearly £4 per acre, the chief items of expense being lime, fertiliser, and seeds 25 per cent., tractor, truck, and car 16 per cent., sheep purchases 15 per cent., and hired labour 11 per cent. Finally the interest surplus on this farm in 1948-49 works out at the amazing figure of £4.7 per acre, which is striking proof of what can be achieved on this type of country by correct management.

Possibilities and Recommendations for Development

It is significant that the farmers of Malvern County have recently shown a keen interest in irrigation. The country is admirably suited for the border dike system, and the experience gained in the Ashburton-Lyndhurst scheme would be a valuable guide for a similar project in Malvern; but it would be many years before irrigation facilities could be made available.

Meantime improvement must be sought through better dryland farm management, for which the survey has shown much scope. It would appear that the sheep-carrying capacity of the Malvern County light lands could be doubled by the wider adoption of good dryland farming practices which have been pioneered by some farmers in the area. Systematic farm improvement plans should be based on:—

1. The development of longer-lived and higher-producing pastures by the use of subterranean clover, lime, and superphosphate.
2. The wider use of lupins as a greenfeed crop and fertility builder.
3. An endeavour to reduce the serious effects of summer drought and grub attack on ryegrass pastures by the use of special-purpose pastures.

Generally it may be said that the more productive and more profitable farms in this area are those where subterranean clover is used successfully. Consequently considerable importance attaches to the method of sowing down pastures in relation to the effect on subterranean clover establishment. The various methods of sowing down pastures used in the area are:—

Under a cereal crop: Provided the sowing is before March, this method may be successful; otherwise there is a danger of frost lift. The subterranean clover will be free to seed while the grain is ripening, but this is not a satisfactory way of establishing grasses, which may have to be introduced later.

Under a greenfeed crop: This will usually be satisfactory if sowing is done after a fallow, but will not be successful if the sowing is made after a cereal crop has been harvested, unless moist conditions prevail. The feeding off of the greenfeed will assist in preventing frost lift.

Under rape: If the sowing is early, there will be the risk of a late flowering of the subterranean clover, which will be lost. If the sowing is later, in December, a satisfactory stand can be established.

Under turnips: With turnips sown in December-January for winter feed subterranean clover can often be established successfully. Stock trampling will prevent frost lift.

On a summer fallow, after greenfeed: This is the best and most reliable method. There are increased cultivation costs, but these are usually repaid by the quality of subsequent pastures. The establishment of the subterranean clover is more sure if the paddock is closed for a ryegrass seed crop in the first year. Usually the yield will not be high, but the subterranean clover will be given the opportunity to reseed, which is essential.

The survey has indicated forcibly that topdressing of subterranean clover pastures is essential to maintain a productive sward on these light soils.

The ability of certain grasses to withstand grub attack and to produce while the basic ryegrass-subterranean clover pastures are non-productive is one of the most encouraging features of recent improvement work on the light Canterbury soils. Lucerne and cocksfoot, for example, will provide feed when the main pasture species have ceased to produce. The mixture is a reliable standby for finishing lambs, and the surplus may be cut for hay. Lucerne hay should become an essential feature of farm-improvement plans.

Recommendations

As regrassing is essential in the farming of the light plains soils, it is recommended that a progressive outlook should be adopted, embodying the following points:—

1. Always include subterranean clover in pasture mixtures.
2. Use 1 ton of lime plus superphosphate in the initial establishment, and follow this up with topdressing as finance allows.
3. Give the subterranean clover a chance to seed by saving grass seed in the first season.
4. Concentrate on increasing steadily the area of subterranean clover, which in turn will lead to:—
    More lambs fat off the mothers.
    Heavier fat lambs.
    An increase in ewe flocks.
    A higher net farm-income surplus.
    A basically more fertile farm as time goes on. The build up in fertility provides an insurance against recessions in prices.
5. Develop a lucerne stand.
6. Grow lupins for greenfeed.

BOOK REVIEW

"Principles of Wood Preservation": T. H. Smith and D. A. Carr

THE slim volume "Principles of Wood Preservation", Bulletin No. 10 of the New Zealand Forest Service, by T. H. Smith and D. R. Carr describes the many methods of timber preservation now in practice, especially those applicable to New Zealand conditions and requirements.

The authors deal with the causes of timber failure, the methods of treatment, and the economic aspects. It is stressed that there are economic limits to the costs of treatment involved in house building and these must be kept down to the minimum consistent with efficient protection against decay and insect damage. Expenditure should be incurred for treatment only on timber which is to be used in positions where it is most vulnerable to attack.

Of greatest assistance, possibly, to farmers will be the discussion and information dealing with the means employed to give an economic life to non-durable timbers when used in the ground for poles, as fencing posts, or for external timber.

This is a technical bulletin on the chemistry of wood preservation, and as such must contain much chemical detail which conveys little to the layman, whether farmer or builder. One would suggest that the very complete information and directions scattered throughout the text might be made more widely useful if the methods available to the non-commercial operator were clearly summarised in language understandable by the layman. Nevertheless, this bulletin will be of great interest and assistance to farmers who wish to treat their own timber efficiently and economically and thus utilise farm-grown trees as durable fencing posts and pest-resistant building timber to replace the disappearing supplies of lasting native species.

The use of many types of preservatives is discussed in relation to their value and efficacy under varying conditions, but it is of note that still no preservative is considered of equal value to creosote for all-round protection of timbers exposed to the elements.

Many farmers will doubtless find in this bulletin a solution to the many small difficulties which arise in the practice of operating a small creosote-treatment plant on their own farms.

—*M.S.*

Government Printer. 6s. 9d.

Why Poultry Meat is not more Popular in New Zealand

POULTRY farming in New Zealand is based mainly on egg production, and such table birds as are offered for sale are markedly by-products of that industry. Most of them are either discarded layers or surplus cockerels reared during the normal breeding season between June and October. Some birds may be reared out of season, but the number is too small to have much effect on the market. Poultry meat is not a popular food in New Zealand, except perhaps at Christmas, and the reasons will be analysed and suggestions for bringing it more into public favour advanced in a series of articles by F. C. Bobby, Superintendent, Poultry Industry, Department of Agriculture, Wellington, of which this is the first.

A breeding pen, consisting of a Light Sussex cockerel and Rhode Island Red females, suitable for the raising of table birds.

POULTRY farmers normally cull their laying flocks in autumn and discard birds which have completed a laying season. Some of these birds are 16 to 18 months old: others may have just completed a second laying season and be 2½ years old. Such birds, particularly heavy-breed hens, may be substantial in weight, but they vary greatly in quality, and even the best of them cannot be classed as "chicken" or roasting fowls. Because of the large proportion of this class of bird being offered to the public at comparatively high prices, table poultry in general is not as popular a food in New Zealand as it is in the United States of America and the United Kingdom. In both those countries specialists in table-poultry production market quality chicken throughout the year, and discarded laying birds are sold as boiling fowls at an appropriate price; they find a steady market and do not compete with the quality roasting or frying chicken.

First-cross progeny of a breeding pen such as that in the upper illustration. These are the best table birds available to New Zealand poultry producers at present.

During the normal rearing season the average poultry farmer must raise more cockerels than are required for stud purposes in the following breeding season. These surplus cockerels, properly managed and marketed at a suitable age, can provide good-quality chicken. The breed of cockerel is an important factor. These birds, 16 to 20 weeks old when sold, are marketed from September onward.

Several reasons may be propounded to explain why table poultry is not more popular in New Zealand.

In the first place, chicken is regarded as a luxury at present prices, and to be popular a luxury must be of good quality—in other words, attractive at the price. New Zealand table birds vary in quality too much. A bird bought at a substantial price may be tough and unappetising when cooked, which dispels any desire to buy another chicken for the table.

Knowledge is lacking on the part of both the producer and the consumer. In most instances the farmer is concerned only with disposing of a surplus product, whether it be a discarded laying bird or an unwanted cockerel; little or no endeavour is made to market a bird attractive to the consumer. Very few buyers of table poultry can distinguish between a young and an old bird. They are influenced in the main by the size of the bird; they want plenty for their money.

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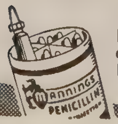

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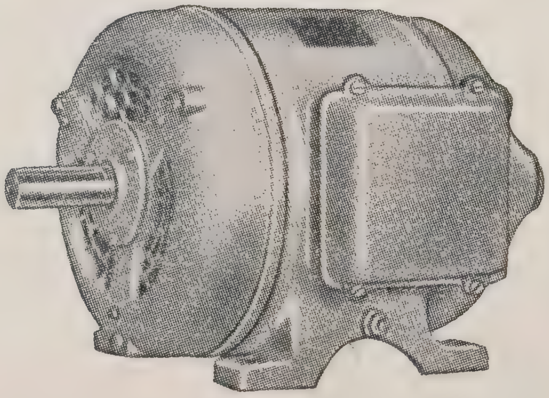

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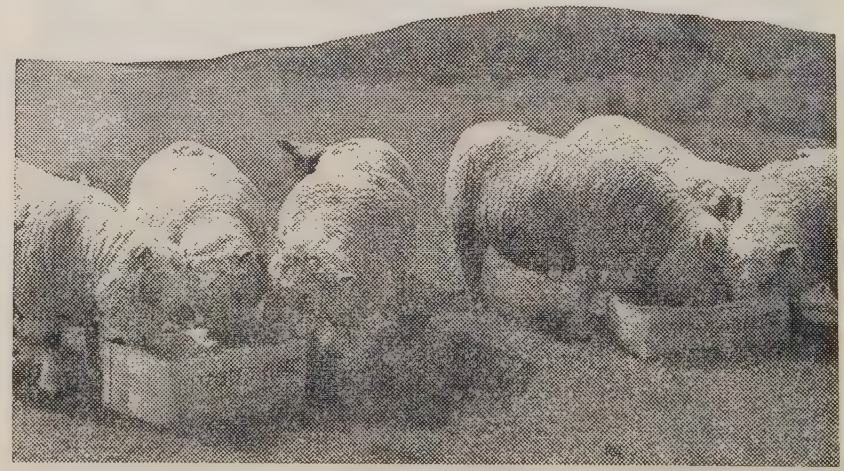

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Unfortunately age and size are often related, and the result is a large, coarse, hard-fleshed bird. People who have had experience overseas of birds specially produced for the table are astounded to hear New Zealand housewives speaking of roasting chickens for 2, 3, or more hours. That in itself is a clear indication of the class of bird being eaten. A 4lb. cockerel (before being trussed for the oven) should require little more than an hour of roasting, after which it should be tender and succulent; long roasting of a quality table bird causes it to dry out and hardens the flesh.

Improvements in Processing

Nevertheless, there has been a marked improvement in the processing of table birds during the past 10 years. An endeavour has been made in some centres to truss birds more attractively and even to market them in transparent cellulose wrapping.

Perhaps more important is the endeavour to distinguish between old and young birds as evidenced by the labels "roaster" or "roasting bird" and "pot boiler". Here is a genuine attempt to educate the public about the two distinct classes of table birds. The improvement in processing table birds was largely a result of the influence of the United States Joint Purchasing Board during the war. The board bought substantial quantities of table birds, for which it set a minimum standard. It was a good if exacting customer, and in consequence its influence on the standard of table bird was considerable.

Producers and would-be producers of table poultry in New Zealand are faced with at least three significant difficulties:—

- Poultry foods are expensive and represent a substantial proportion of the cost of production. Labour costs are also high and affect in particular the cost of plucking and processing birds.
- The breeds most popular in New Zealand do not make good table birds by even moderate standards. In particular this comment applies to the White Leghorn, which is by far the most common breed.
- The buying public lacks knowledge of quality table poultry. A good bird is recognised on the table after being cooked, but the need is for greater ability to select the right bird when shopping. If the poultry producer is to raise a good-quality bird, it must find a ready market at reasonably higher prices than the by-products from egg-producing farms.

Breeds Suitable for Table Birds

The ideal bird to be reared for the table is one that will give the maximum of rapid gain in weight for the lowest possible food consumption. This aspect has received close attention in the United States, where consumption of poultry meat is particularly high. Breeding to increase egg production is well appreciated and understood by poultry farmers; similar study and development have now been applied to the raising of strains which give much-improved table birds. Until recently 4lb. of food were considered necessary to produce 1lb. of poultry meat; strains have now been developed in the United States which require only 3lb. for the same purpose, and birds can be raised to give 4 to 5lb. of chicken at about 12 weeks old. This is indeed specialised table-poultry production.

Another requisite of a good table bird is that it shall carry a high proportion of breast meat. The proportion of meat to bone should also be high.

White Leghorns cannot meet these requirements, as the breed is essentially suitable only for egg production. Discarded layers and surplus cockerels have a place on the market, but not as high-class table birds. Australorps or Orpingtons are better, but carry a big proportion of bone to meat and cannot be termed first-class table birds. Black stubs in younger birds detract from the appearance of the carcass.

The Rhode Island Red, which is increasing in popularity, carries a fair proportion of breast meat. One of the most popular breeds for table-bird production in the United Kingdom is the Sussex, in all its varieties. The small numbers of Light Sussex available in New Zealand at present are insufficient to produce many table birds. On the other hand, the cross between the Light Sussex male and the Rhode Island Red female gives an excellent table bird and one much favoured in the United Kingdom. Here is a first-cross bird which might well be raised in New Zealand for table-poultry production. It is the best bird available to New Zealand producers at present.

☆

Caponisation of Cockerels by Injection

CAPONISATION or castration of cockerels is practised extensively in some overseas countries, notably in the United States of America, to improve carcass quality and size. Until recently the operation was always performed surgically. A method of chemical sterilisation which has been evolved lately, and which trials under commercial conditions have shown to be of definite economic value, is described in this article by A. C. Howse, Veterinarian, Department of Agriculture, Christchurch.

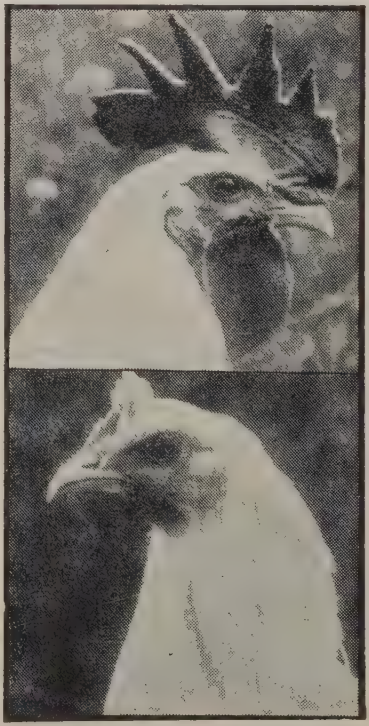
THOUGH poultry are kept on a moderate scale in New Zealand for commercial egg production, poultry fattening is not carried out on a significant scale because such an industry would be unlikely to yield large profits, as the demand for table poultry is not great. In fact, many poultry farmers destroy all their cockerel chicks at the day-old stage, immediately after they have been sexed, as they consider that rearing them as table birds would result in a loss rather than a profit. A few poultry keepers, however, specialise in the production of table poultry, and to these farmers caponisation is of particular interest.

Caponisation by surgery is generally done at the age of about 10 weeks. The capon, as the castrated cock bird is called, is quieter, more docile, and less quarrelsome than a cockerel. It puts on weight more readily and the carcass meat is of better quality. If capons are left alive long enough, they grow quite large. An average capon of one of the ordinary heavy poultry breeds would reach a dressed carcass weight of about 10lb. at 8 to 10 months old.

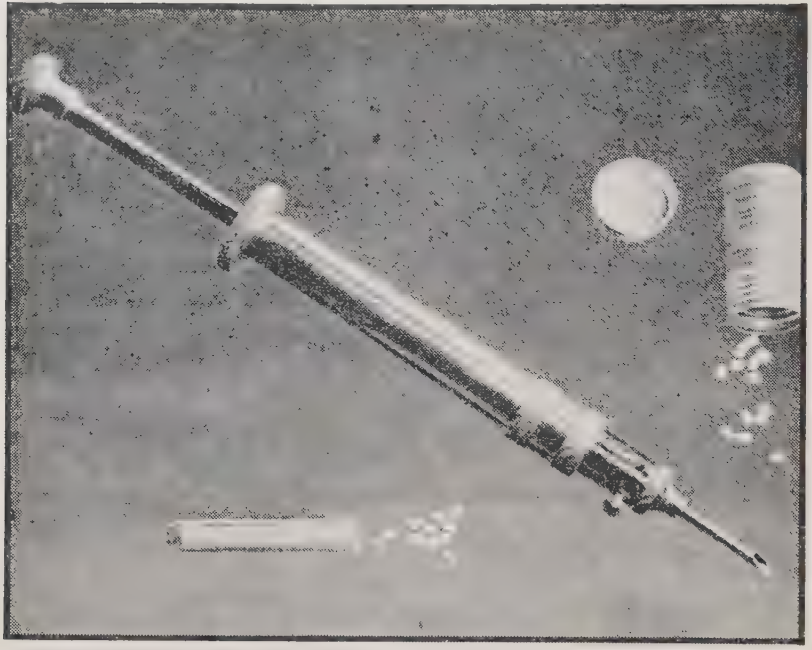
In some countries the demand for capons of this size might be sufficient to make their production worth while economically. However, the bird must be housed and fed for 8 to 10 months to reach this size and the expenditure involved would be considerable. It is unlikely that rearing such birds in New Zealand would pay.

Chemical Sterilisation

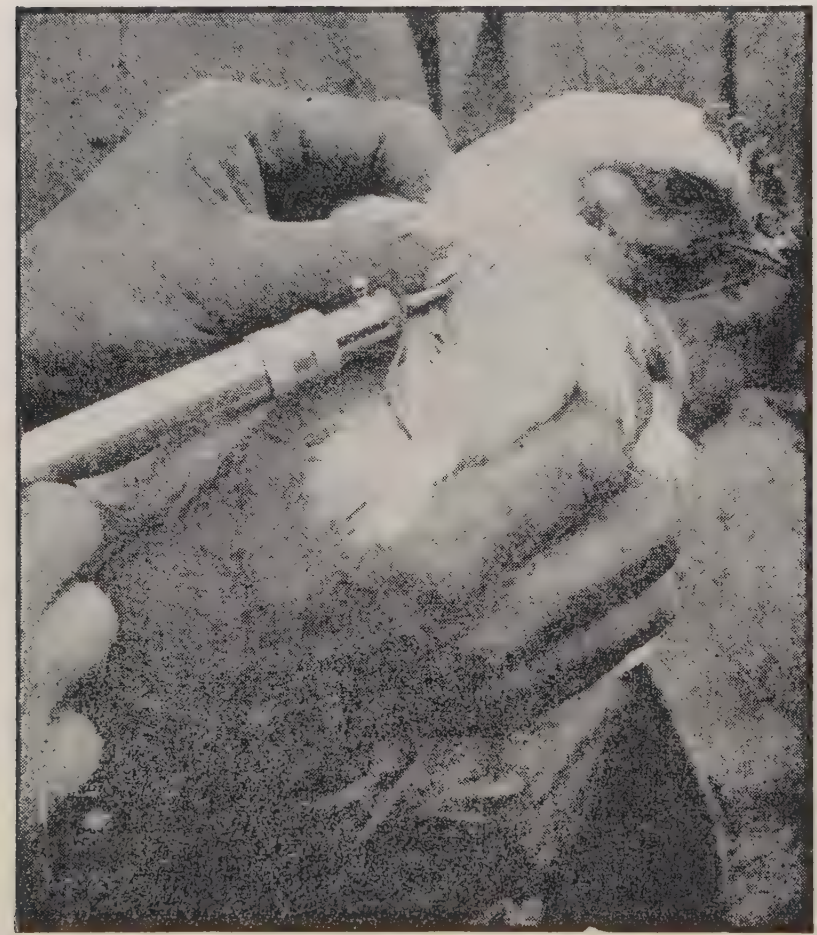
However, caponisation can be usefully employed when cockerels are reared to be killed at the usual age of 21 weeks, and sterilisation by the injection of stilboestrol is quite suitable for this purpose. Compared with surgical caponisation, it has the advantage that the operation calls for



The heads of White Leghorn cockerels of the same age untreated (upper) and caponised (lower).



Above—The pellets and special instrument used for caponisation of cockerels by stilboestrol injection. Below—A bird being treated by the method described on the right.



little skill. There is therefore less risk of death of the treated birds because of unskilful attempts at surgery, and less cruelty is likely to be involved. The main disadvantage is that treated birds do not always "take" and a few may have to be done more than once.

To caponise a cockerel by this method a pellet containing 15 mg. of stilboestrol is injected under the skin of the neck close to the head and left there. A special instrument can be obtained to make the injection, but if this is not available, the skin can be nicked with scissors, the pellet pushed in with forceps, and a stitch inserted to keep it there, though this is a long and laborious process, particularly if large numbers of birds are being treated. The pellet remains at the site of injection and the stilboestrol is absorbed slowly.

When a young male bird is treated in this way the gradual absorption of stilboestrol arrests the growth of the testicles and masculine characteristics do not develop. The comb and wattles remain small, the bird is docile and does not become quarrelsome, and sexual desire is absent. These effects are extremely useful to producers of table poultry, as treated male birds are less likely than ordinary cockerels to kill or injure each other during fighting and, as they run about less, they put on weight more rapidly. They are also less noisy, as they do not crow.

Effects of Injection

Cockerels injected with stilboestrol at the age of 14 weeks and killed at 21 weeks have been found to average about 1lb. heavier than untreated cockerels managed similarly and killed at the same age. Moreover, there are no casualties from fighting. In 95 per cent. of the treated birds one injection is sufficient, but in some the effect appears to wear off after a time. Such birds revert to cockerel characteristics, but a second injection usually brings about the caponising effect. Some such cases may be the result of inefficiently performed injections, with loss of part of the dose.

The injection is made in the neck because, as the head is discarded when the carcass is dressed, any small portion of the tablet which might remain would also be removed. However, the possibility of any remnant or even the whole of the original dose being accidentally consumed need cause no alarm, as this small amount of stilboestrol, taken by mouth, would be unlikely to have any harmful effect on a human being.

Treatment of Adult Birds

It has been stated that adult cocks also can be caponised in this way, but in practice this does not seem to be so, except perhaps with repeated injections. An adult fowl seems to have greater resistance to the treatment, and that is to be expected, as it is necessary not merely to prevent the growth of immature sexual organs but to cause the recession of adult organs which are already fully developed. In all events, the question is mainly one of academic interest only, as in practice the treatment of young stock is likely to yield most useful results.

Recent Research Work

MARGINAL LAND TRIALS

THE IRONSTONE SOILS of Northland cover some 100 square miles of country in Bay of Islands and Whangaroa Counties. The soils are naturally infertile and since 1926 a considerable amount of investigational work has been carried out by the Extension Division of the Department of Agriculture to define suitable grassing and development practices.

LIME AND PHOSPHATES

WORK CARRIED OUT between 1926 and 1940 indicated that pastures of not very high carrying capacity could be established and maintained if a seeds mixture of Certified strains of grasses and clovers were sown on a firm seed-bed on fallowed land and the land heavily limed and treated with phosphates. Two tons of lime were required as an initial dressing, with 3cwt. of superphosphate sown with the seed, followed by a further 3cwt. in spring and thereafter an annual topdressing of 3cwt. of basic slag.

RESPONSES TO POTASH

THE OUTSTANDING FEATURE of investigational work since 1940 has been the responses resulting from the use of potash in addition to lime and phosphates. While lime and phosphates gave only fair pastures, the addition of potash has resulted in an increase of 20 per cent. in pasture production. At sowing, 1cwt. of muriate of potash should be used, followed by an annual dressing of ½ to 1cwt.

—J. E. BELL

* * * *

PASTURES ON SAND COUNTRY

IN CO-OPERATION with the Department of Lands and Survey and with farmers doing development work on coastal sand country in the Manawatu the Department of Agriculture recently carried out a number of trials which have given very valuable information. Most important of this information is that concerning the influence of the water-table in the establishment and maintenance of pastures on sand flats and the necessity for careful planning of drainage in sand country so that the water-table is maintained as near the surface as possible compatible with prevention of the accumulation of stagnant water at or above the surface for any length of time. A second finding from these trials shows the importance of adequate phosphatic fertilisers in the establishment and early growth of clovers and the importance of a good clover strike to the grasses. A further important factor is the type of sand, there being at least five main types of sand occurring on the extensive areas of sand flats and low sand ridges.

The suitability of grass and clover species is very dependent on the soil type and more particularly on the maintenance of the water-table near the surface. Where the water-table can be maintained near the surface perennial ryegrass, short-rotation ryegrass, white clover, and red clover can be made to thrive. Where the water-table recedes during dry weather to any considerable depth below the surface subterranean clover takes the place of white clover and red clover, the ryegrasses tending to thin out. Where the water-table rises above the surface for any long period in the winter strawberry clover and paspalum are the two species that can be maintained.

—C. J. HAMBLYN

* * * *

SCRUB CONTROL BY CHEMICALS

WHEN SUPPLIES of the 2, 4, 5-T (2, 4, 5-trichlorophenoxyacetic acid) type of hormone weedkiller became available in New Zealand the Department of Agriculture carried out a wide series of trials to investigate the range of woody weed species that could be controlled economically with this chemical. These trials are continuing. The main experiments are located at Flock House, Bulls, and at the Phormium Development Area, Moutoa, and 15 co-operative trials were laid down in other areas of New Zealand. The main weed species treated were gorse, blackberry, and willows, but four trials were laid down on tutu and sweet brier. At Flock House a monthly series of applications was made to blackberry and gorse at various stages of growth. These trials incorporated the commercial formulations and experimental mixtures of 2, 4, 5-T and 2, 4-D (2, 4-dichlorophenoxyacetic acid) as well as treatments with various formulations of 2, 4, 5-T.

GORSE AND BLACKBERRY

TRIAL RESULTS have shown that gorse may be controlled efficiently and economically with certain types of 2, 4, 5-T formulations. The best stage of growth, time of application, concentration of weedkiller, and other factors influencing the control of gorse with 2, 4, 5-T have been determined. Species like manuka, kanuka, and tauhinu that will not grow from cut or burnt stumps can also be controlled with 2, 4, 5-T. The same principles apply in the control of these species as of gorse.

Most species of blackberry cannot be eradicated with the one application of 2, 4, 5-T, although a foliage kill is readily obtained in most cases. Experimental work with 2, 4, 5-T on blackberry is therefore being continued to evaluate the efficiency of various preparations and to determine the best time of application, concentration of the weedkiller, and stage at which regrowths following initial foliage kills should be treated.

A "brushkiller" preparation popular in the United States consists of a mixture of 2, 4-D and 2, 4, 5-T chemicals. In this country the efficiency of such a mixture in the control of woody plants, particularly gorse, blackberry, and manuka, appears to depend on the 2, 4, 5-T content, and the inclusion of 2, 4-D is not justified. The types of 2, 4, 5-T formulation at present available in New Zealand could, with advantage, include the volatile forms as well as the non-volatile forms.

—L. J. MATTHEWS

* * * *

OXALIC ACID SUPERPHOSPHATE

THE RECENT REPORT "Fertilizer Production in New Zealand" by Dr. G. L. Bridger refers to oxalic acid superphosphate, an experimental product developed in the Department of Agriculture Soil Research Station, Rukuhia. The process outlined should have been attributed to K. F. Hoy, fertiliser chemist, who originated the proposal and demonstrated that the product had a number of desirable features.

Commercial possibilities of exploiting the process hinge on the practicability of production of cheap oxalic acid. Oxalic acid is a crystalline solid combined with approximately 30 per cent. of water. Oxalic superphosphate can be made simply by grinding rock phosphate and oxalic acid together, damping it with a small amount of water, and allowing the mass to react. Subsequent operations are the same as for normal superphosphate, and the product is very similar. The chief difference is that calcium oxalate replaces calcium sulphate as a secondary constituent in the superphosphate. Last autumn field trials were laid down using a "short acid" mix comparable with "super. compound", but a straight superphosphate can equally well be made.

Oxalic acid can be produced from a variety of carbohydrate materials by oxidation using either chemical or microbiological processes. In New Zealand sawdust or the waste liquor from sulphite wood pulp should, if the chemical engineering requirements can be satisfactorily developed, eventually be adequate to supply sufficient raw carbohydrate material for large-scale oxalic acid production.

Dr. Bridger considers the process of sufficient interest to warrant further study and pilot-plant development.

—R. E. R. GRIMMETT

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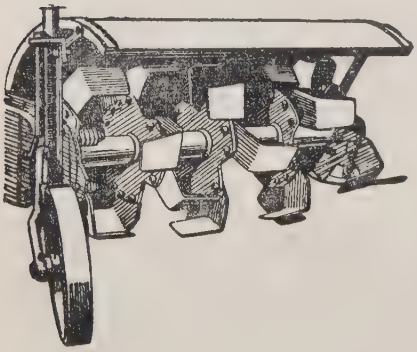

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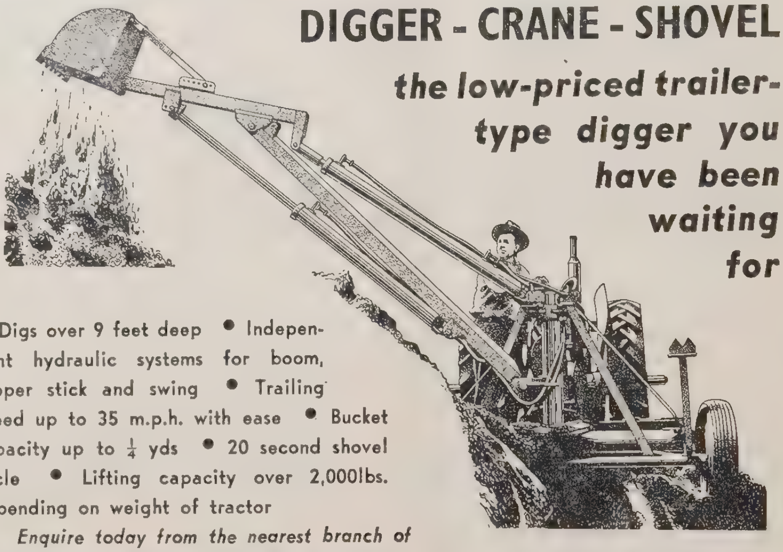

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The Removal of Honey from Hives

Seasonal Notes for the Domestic Beekeeper

By S. LINE, Apiary Instructor, Department of Agriculture, Invercargill

REMOVAL of the honey crop this season has probably been accomplished with the desirable minimum of disturbance to bees, but for the rest of the season the beekeeper must be prepared to contend with bees in a different frame of mind; they will be collecting a reduced harvest of nectar or having to travel further to collect a load and this results in their being much more aggressive. The beekeeper should therefore have on hand at the apiary all gear likely to be required.

A BEEKEEPER moving among his hives should have near him his wheelbarrow or an empty super or some suitable support for holding supers removed from the hives while a quick glance is given to the condition of the brood. Close at hand there should be several clean sacks one of which should be spread over any super of honey removed or over hives the lids of which have been removed and in which combs of honey have been exposed. No bee combs should be exposed to marauding or inquisitive bees at this time, for the workers are particularly eager to find an easy source of food, and if it can be stolen from combs, they quickly do so and are persistent.

Usually honey is exposed temporarily only when the beekeeper is handling frames or examining brood for possible disease. This work is important where there has perviously been any foul-brood in the apiary; otherwise foul-brood honey may be taken to the honey house, the honey extracted, and the combs dispersed among several hives before it is discovered that disease is present in one or several hives. Some beekeepers after extracting honey and redistributing the combs have made the unpleasant discovery that disease was present and that the redistributed combs were likely to spread the infection in the apiary.

If disease is discovered when honey is being taken off, the supers attached to the infected hive should be quickly lifted from the barrow back to the hive and the mat and lid replaced in such a way that robbing cannot take place at the top. For the remainder of the day the entrance should be reduced to a small opening so that it may be easily defended by the guards. If the entrance is completely closed, the field bees returning may ultimately enter a nearby hive to deposit their load and thereby endanger adjacent hives; until night it is therefore better to have a small opening.

After an infected hive is closed up attention should quickly be given to drips of honey on the barrow, lid, or stand used and the smoker and hands should be thoroughly washed. If honey has dripped on to grass, it should be covered with a heavy sprinkling of earth; if rain is likely, the honey can be washed down by using a watering can.

Using a wheelbarrow that is built with a flat deck and a rubber tyre is a great convenience, and where ground is rough, such as around an apiary in a field, the cushioning effect of the tyre will reduced breakages in combs weighing perhaps 7 or 8lb. each.

Use of Escape Boards

As the season advances the removal of honey from hives may be delayed when the weather is persistently wet. If the weather forecast before the day on which a beekeeper has planned to extract or take off honey indicates that conditions may be unfavourable for handling bees, bee escape boards can be used. Several of these boards would be helpful to those who have only weekends in which to attend to bees, for then the honey can be removed regardless of weather conditions. Their only disadvantage is that they necessitate two trips from the honey house to the apiary, one to place the escape boards in position and the second to remove the honey.

Various patterns of escape boards are available, some made with wire mesh and others with a uniform surface of light wood. Those made entirely of light wood and fitted with two Porter bee escapes give general satisfaction. Many have one Porter bee escape, but the one escape does not give the quick clearance of bees from the upper super that two fittings in the board will give, and it might become accidentally blocked with burr comb.

Where two people can work together in placing escape boards the operation can be done much faster, as one lifts the super and the other places the board in position while clearing off any unduly projecting burr comb. In changeable weather the help of another person makes a considerable difference in the quick opening and closing of hives. These boards should be placed on hives during the afternoon or evening before the day of extraction. Hives having faulty or damaged edges should then have the gaps plugged with grass, which is pressed in with the hive tool, to eliminate the risk of undefended honey being robbed.

Replacing Wet Combs

Wet extracted combs may be returned to hives two or three times in a season and the beekeeper with a few hives only should do this work in the evening just before dark. Where there are a large number of hives, it would be impracticable to replace extracted supers in the evening, and as the aroma from the wet combs is exciting and stimulating to bees, they soon come out of their hives to search for the source of this fresh scent; robbing is thus easily started. Where bees appear to adopt a hovering and darting movement at the entrance of a hive a few handfuls of wet grass should be placed over it so that robbers will be discouraged.

[*Elmwood Studios photo.*

Using a bee escape board to eliminate bees from honey combs. The bees can pass only downward through the patent fitting in the board and the day after the board has been placed in position the combs should be free of bees and the honey may be removed.

Fine Graining of Honey

The fine granulation of honey is one of the difficult essentials of good beekeeping, and some beekeepers are fortunate in being in districts where the various nectar sources have no detrimental effects on the final condition of the honey. As there is a tendency in many areas for honey to develop a sugary or coarse grain, every effort should be made to introduce into the tanks of liquid honey a fine-grain starter, which is a type of honey that is so smooth that when a sample is pressed with the tongue against the palate there is no feeling of crystal formation or grittiness. It may be necessary to buy a few pounds of a recognised smooth-grain type, and by adding a small quantity of liquid honey this can be made plastic enough to tip into a tank. Sufficient of this mixed honey should be tipped in to make the tank of liquid honey slightly cloudy.

The starter should be stirred until the whole of the honey is of uniform appearance, with no white streaks remaining from the starter. Ten to 15 minutes of stirring each day for 3 days should suffice, and then it may be run off into containers. The longer it can be kept in the tank and stirred occasionally (without becoming too thick to run out) the more spreadable the finished product will be, but care should be taken to keep it covered to prevent contamination by moisture or dust until it is packed and sealed.

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Planning Housing for a Household Poultry Flock

MANY household poultry houses are eyesores, mainly because little attention is paid to their design when they are built. Lack of knowledge of the minimum requirements for poultry often leads to poor results, particularly during winter. This article by the Livestock Division sets out details of good housing for domestic poultry—housing which will improve the value of a property and not detract from it. A poultry house need not be elaborate, but should be sound and lasting with reasonable annual maintenance.

BEFORE any type of poultry house is built the number of birds to be kept will be decided. A decision on this point will be influenced by whether the householder wishes to keep only enough birds to supply adequate eggs for the family or whether the intention is to make poultry keeping a paying hobby which might, for instance, pay for outgoings in maintaining an attractive garden. The time involved in caring for the birds will be little more for 36 than for 6, but that is a decision for each household to make.

However, average egg production per bird for each month can be assessed and can give some guide to the novice, though it cannot be accurate and is meant only as a guide: March, 6; April, 7; May, 8; June, 10; July, 12; August, 15; September, 20; October, 19; November, 18; December, 15; January, 13; February, 10. Some household flocks will produce less and others may exceed substantially the figures given, but there is no reason why comparable results should not be obtained if pullets of average production capacity are bought and maintained in good health.

The figures given are based on pullet production only. They would apply also to fairly late-hatched birds which have not come into winter production well, but earlier-hatched pullets, particularly of a heavy breed, should give substantially better winter production. However, many householders buy light-breed birds, many of which are hatched comparatively late. Pullets must be ordered early to ensure that they have been hatched at the right time.

Choice of Site

Before a site for a poultry house on a town or city property is decided, the requirements of local by-laws must be ascertained. Choice of a site will be influenced by factors such as the size and shape of the section and the position of the dwelling, but the following requisites should be complied with as far as is practicable:—

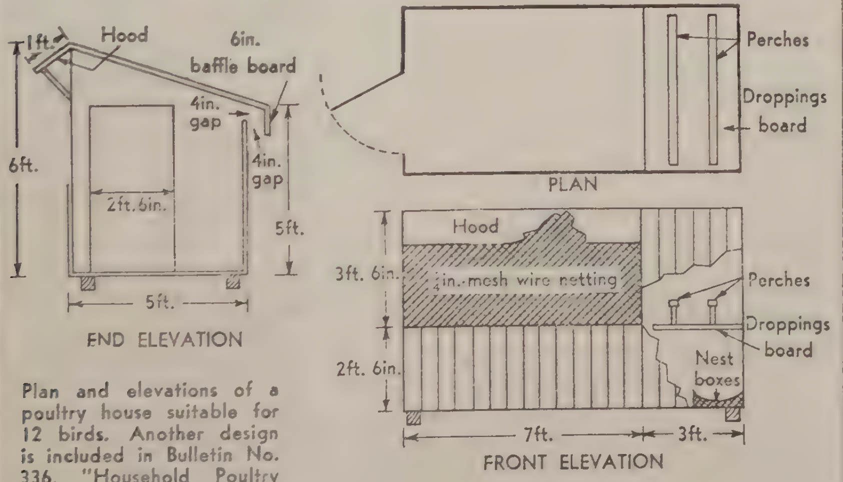
The poultry house should face approximately due north to give the birds a maximum of sunlight. The direction of the prevailing winds must be taken into consideration and, to avoid the wind blowing straight in, the house may need to be turned toward the east or west—preferably east.

The site must be dry and not overshadowed by trees or other building. Shadow is particularly undesirable in winter.

The poultry house should have a dry path in front of it and leading to the home. Concrete is preferable.

Outside Runs Unnecessary

Provided sufficient floor space per bird is allowed in a laying house, an outside run is unnecessary for birds kept solely for egg production. Small, dirty runs outside poultry houses not only are unsightly, but can become a menace to the birds by harbouring disease. Unquestionably it is preferable to confine birds to a good house than to allow them access to a run inadequate in size. Few town or city dwellers have sections big enough to permit of a grass run or even an earth run which can be kept clean in winter. Birds gain nothing by walking over fouled or muddy runs.



Plan and elevations of a poultry house suitable for 12 birds. Another design is included in Bulletin No. 336, "Household Poultry Keeping".

The slightly larger house required for birds to be wholly confined costs little more than a smaller building and the wire netting and posts required for an outside run.

Planning the Poultry House

Certain features are essential in a poultry laying house irrespective of the number of birds being kept. They may be summarised as follows:—

The house must be well ventilated but free from draughts.

The floor must be dry even during bad weather.

The front of the house should permit sunshine to strike the floor over a wide area, even in winter.

The birds should have between 4½ and 5 sq. ft. of floor space each if they are to be wholly confined to the house.

The inside of the house should be as light as possible.

If some of the birds are to be kept for more than one laying season and only a proportion of pullets is to be bought annually, facilities must be provided to keep the young pullets away from the mature laying birds until they are fully grown. Unless that is done the older birds will bully the young ones, particularly at feeding time, and in consequence the growth of the pullets will be retarded. This means that the house must be divided into two sections, which may be maintained permanently or be formed temporarily by a removable wire-netting division.

Design can be Varied

Provided the essentials laid down are adhered to the design of the house can be varied to suit the circumstances and the owner's wishes, but as a guide one design is given on this page and another is included in Bulletin No. 336, "Household Poultry Keeping", which may be obtained free from any office of the Department of Agriculture.

Reminders for March

Cull any bird which goes out of production this month, particularly if it moults. Such a bird is likely to be a low producer not worth retaining for a second laying season.

If new pullets are expected, clean their quarters thoroughly. Watch for lice and use nicotine sulphate on the perches when necessary.

Fibrous greenfeed in dry weather or poor lawn clippings are of little value to poultry. Endeavour to feed succulent greenfeed—lettuce, silver beet, or fresh cabbage leaves.

Remove broody birds regularly to a broody coop.

Store eggs in a cool place in hot weather and thus lengthen their keeping period.

Pea Wilt: Field Identification and Varietal Resistance

PEA WILT (*Fusarium orthoceras* Appel and Wollenw. var. *pisi* Linford) was first recorded in the United States of America by Linford in 1928 as a major disease of peas. Though the disease was first recognised in New Zealand in 1948 (1), the present distribution and amount of infection indicate that it has probably been present in the older pea-growing districts for at least 10 years. I. A. M. Cruickshank, Plant Diseases Division, Department of Scientific and Industrial Research, Christchurch, here describes the disease and gives the names of resistant and susceptible varieties of peas.

Crop of Greenfeast peas, showing typical patch of dead vines caused by pea wilt.

CROP surveys over the last 3 seasons (1948-51) have shown that pea wilt is a serious disease in North Canterbury and Blenheim. The most serious losses were observed in the Marshland-Belfast-Harewood and the Taitapu-Lincoln-Southbridge districts. Smaller losses were seen in the Rangiora district and in Blenheim.

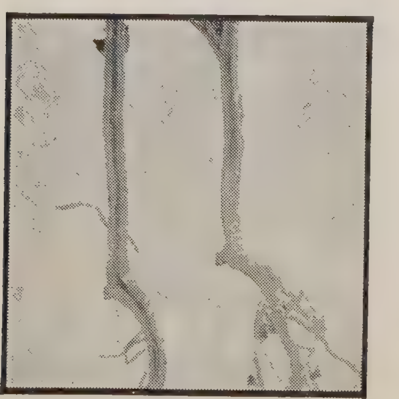
Field Symptoms

Pea wilt appears in crops, at any stage of growth up to flowering, as circular patches of brown, dead pea vines scattered through the crop. The patches may vary in diameter from a few feet to several yards, depending on the amount and distribution of infection in the soil. When crops of peas have been grown repeatedly in infected fields and soil infection has become general complete crops may be destroyed.

Close examination of infected plants at different stages of disease development reveals at first recurving of the tips of younger stipules and margins of leaflets. This is followed by downward curling of leaflets upon their main vein, so that leaves assume a tightly rolled appearance. Stem and leaves are at first covered with a dull bloom. Later they lose their colour, becoming rigid while the joints of the leaflets become brittle. The vascular system of stem and root is commonly discoloured orange or brick red. No externally visible lesions occur on either stem or root, but the lower internodes of stems are usually greater in diameter than those of healthy plants. Infected plants turn pale, yellowish green at first and death follows rapidly. Some diseased plants may reach the flowering stage, but very few set seed.

Influence of Environment

Soil temperature: Moderate soil temperatures are favourable for wilt development. The optimum temperature is 18 to 22 degrees C. (2).



Left—Longitudinal section of stem and root of an infected plant, showing discoloration of water-conducting tissue. Right—A healthy plant.

Soil moisture: Wet soils favour early development of symptoms, but drier soils favour the rapid death of infected plants (2).

Soil reaction: Alkaline soils, pH 8.0, are most favourable to wilt development (3); however, the disease can also be severe in acid soils, as indicated by the serious losses due to wilt in the peat soils of the Marshland district near Christchurch, which have a pH of 5.2 to 5.4.

Dissemination and Survival

Transmission of wilt within the seed has been demonstrated (3). However, contamination of the surface of the seed is of more importance. Infected soil may also be spread by such means as cultivation practices, on farm implements, or by animals. Once wilt has been introduced into a field it spreads within the soil when peas are being grown and also when the field is fallow or in some other crop. The disease survives indefinitely in soil; a wide rotation merely slows down its rate of spread.

Resistance of Varieties

Over the last 3 years trials have been carried out with local and imported varieties of peas to determine their resistance or susceptibility to local isolates of pea wilt. The results are as follows:—

Garden Varieties

Resistant: Alderman, Bliss Everbearing, Climax, Director, ~~English Wonder~~, Epicure, Giant Alderman, Giant Stride, Glaciator, Hurricane, Kelvedon Standby, Kelvedon Triumph, Laxton's Progress, Lord Chancellor, Major, Morse's Market, Multipod, Progress, ~~Quartermaster~~, Queen, ~~Stratagem~~, Triumph, Yorkshire Hero.

Susceptible: Autocrat, Blue Bantam, Cambridge Multipod, Charles I, Churchill, Confidence, Coronation, Duplex, Exquisite, First and Best, Foremost, Gladiator, Greencrop, Greenfeast, Hursthouse, Kelvedon Monarch, Kelvedon Paragon, Laxton's Superb, Little Gem, Little Marvel, Meteor, Miracle, Onward, Phenomenon, Pilot, Pioneer, President Wilson, Radium, Spitfire, Superb, Thomas Laxton, Veitche's Perfection, V.C., W. F. Massey, Wando, Witham Wonder.

Field Varieties

Resistant: ~~Blue Prussian~~, Gruno, Hala, ~~Harrison's Glory~~, Helios, ~~Mammoth White~~, ~~Marathon~~, Vinco, White Canada, Zelka I, Zelka II.

Susceptible: Austrian Winter, Conservo, Mammoth Blue, Mansholt, Parel, Partridge, Rondo I, Rondo II, Unica, Victoria.

Canning Varieties

Resistant: Canner's King, Canner's Perfection, Commando 2685, Deep Green Perfection, Delwiche Commando, Delwiche 21, Early Badger, Horal, Merit, Penin, Perfected Whales, Perfection, Wisconsin Early Sweet, Wisconsin Perfection.

Susceptible: Alaska, Canner's Queen, Early Perfection.

Sugar Varieties

Resistant: Dwarf White Sugar, Mammoth Melting Sugar, Melting Sugar.

Control Measures

1. Seed for resowing should not be taken from diseased crops.

2. Before being sown seed should be treated with a certified fungicidal seed dressing, that is, a dressing which has been tested by the Plant Diseases Division, Department of Scientific and Industrial Research, and found satisfactory. A list of certified therapeutants is published biannually.

3. Crop refuse should be destroyed.

4. A crop rotation of 4 to 5 years should be practised to slow down spread.

5. Fields known to be infected with pea wilt should be sown only with wilt-resistant varieties.

References

1. "New Zealand Journal of Science and Technology", vol. 33, No. 4A, pp. 75-80, "Pea Wilt in New Zealand", I. A. M. Cruickshank (1951).

2. University of Wisconsin Agricultural Experiment Station Research Bulletin No. 85, "A Fusarium Wilt of Peas in Wisconsin", by M. B. Linford (1928).

3. University of Minnesota Agricultural Experiment Station Technical Bulletin No. 89, "A Study of Diseases of Canning Crops (Peas and Corn) in Minnesota", by G. H. Starr (1932).

Pasture Topdressing in Central Otago

By P. B. GOW, Fields Instructor, Department of Agriculture, Alexandra

FIFTY manurial trials on pastures have been laid down in the Central Otago instructorate over a period of years. Most of the trial plots were established on irrigated or semi-irrigated areas and on pastures containing a fair proportion of clovers, as to obtain benefit from fertiliser and lime it is essential to have clover in the sward. Where a sward is composed of grasses alone, as are many old pastures throughout Central Otago, the addition of lime, phosphate, or potash does not have nearly as marked an effect as where clovers and grasses provide a mixed pasture.

TOPDRESSING is expensive to carry out in Central Otago, and it is therefore important that the sward to which the manures are being applied should contain productive pasture species. To obtain the greatest benefit from topdressing farmers should topdress young pastures and renew old pastures by ploughing up and resowing in grass after a season or two in crops. By this means the grass area will be kept up to peak production and consequently stock-carrying capacity will be increased.

Farmers throughout the area have shown an increasing interest in topdressing and in a number of instances are topdressing the younger grass areas, but in too many cases an endeavour is being made to stimulate old pastures comprised of inferior pasture species by the application of fertiliser and lime. Over the past year there has been a large increase in liming in Lake County and the Wanaka and Hawea Flat districts of Vincent County due to the opening of two lime pits by a bulk-lime contractor, who has been spreading lime at the rate of 1 ton to 4 tons per acre. Results of the trials and soil tests do not justify these heavy dressings of lime. A dressing of lime of 10cwt. per acre has proved sufficient in most cases to rectify the small lime deficiency in evidence. In many soils of Central Otago no lime is required, as they are already well supplied with bases.

Superphosphate has shown response in most of the trial plots and should be used more throughout Central Otago. Although the phosphate content of the soils is high, it tends to be in an insoluble form and plant growth may be restricted unless assisted by artificial phosphates. Most farmers apply 1 to 1½cwt. per acre when sowing out pastures and should then apply another dressing in the following season to stimulate the young plants.

Soil Series

The soils of the Central Otago basins are developed from alluvial material which has been derived from the surrounding ranges, which are composed of mica schist or greywacke rock.

In the following classification, a provisional one drawn up by J. D. McCraw, of the Soil Bureau of the Department of Scientific and Industrial Research, types 1 to 9 inclusive are related, but 1 to 4 were developed in a rainfall of less than 17in. per annum, and 5 to 9 were developed in a rainfall of 17 to 30in. per annum:—

1. **Molyneux soils:** These are usually found on the first set of terraces above the river flats and are mainly sandy loams, but heavier soils occur at a distance from the streams. The topsoils have a very weak structure which is liable to break down to a powdery condition under cultivation, making the soil subject to wind erosion. There is often an accumulation of calcium carbonate at a depth of about 3ft. These soils are high in plant nutrients and only require irrigation to make them highly productive.

2. **Loburn soils:** These occur on the second set of terraces above the river flats and although the structure is still weak, it is better than that of the Molyneux soils. They are slightly more leached than Molyneux soils but still have carbonate accumulations, although they are at a greater depth than in the latter soils. The texture is commonly a loamy sand and as the soil is often shallow, irrigation is slightly more difficult than on the lower terrace.

3. **Pisa soils:** These are developed on the highest set of terraces. They have better structure and greater depth of topsoil than those on the lower terraces.

4. **Alexandra soils:** These are developed on land that is only rarely suitable for arable farming. The topography is usually easy to strongly rolling and outcrops of rock are common. The texture of these soils is a sandy loam and their loose, powdery structure makes them susceptible to wind and water erosion. The soils are high in plant nutrients and often have accumulations of calcium carbonate and soluble salts in the profile. The soils are usually shallow, but respond well to irrigation.

5. **Ranfurly soils:** These are found on the first set of terraces above the river flats, but differ from the Molyneux soils in that they have a deeper topsoil and a granular structure. They are more leached than the Molyneux soils and have no calcium carbonates in the profile, but they are still relatively well supplied with plant nutrients. Irrigation would help production on these areas.

6. **Drybread soils:** These are found on the second set of terraces and have a better structure than the Ranfurly soils.

7. **Clyde soils**, and 8. **Hawea soils:** These are on the highest set of terraces and have a good crumb structure.

9. **Omarama soils:** These are formed on schist rock and usually have a sandy loam texture. The structure of the topsoil is not very strong and the soil is susceptible to erosion. The soils

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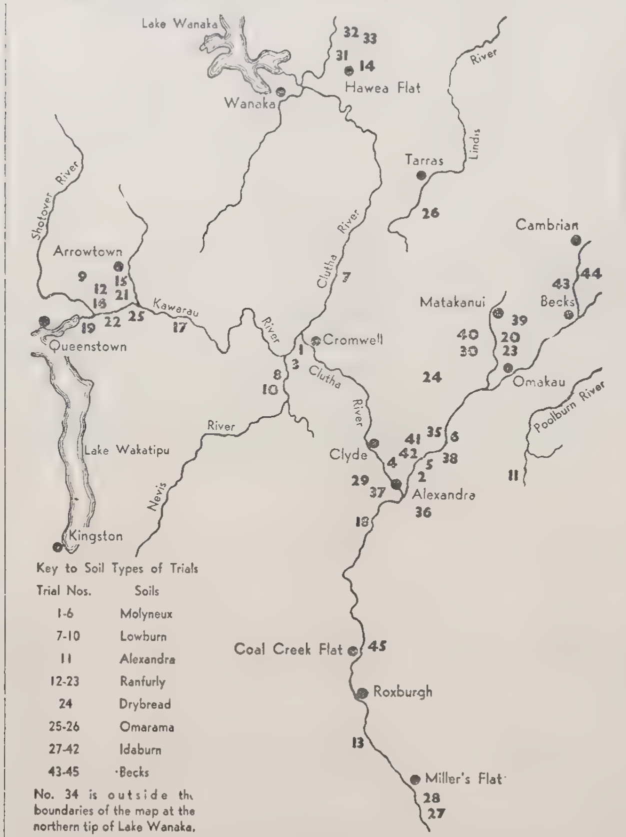
HEADING PHOTOGRAPH: Hawea Flat, Central Otago.


Lake Wanaka
32 33
31
14
Hawea Flat
River
Wanaka
Shotover River
Tarras
Lindis
26
Cambrian
Clutha River
Arrowtown
9
12
15
16
21
7
43
44
Becks
Matakanui
39
Kawarau
19
22
25
17
River
Cromwell
40
30
20
23
Queenstown
1
3
Clutha
8
10
24
Omakau
Poolburn River
River
River
Lake Wakatipu
41
35
6
Clyde
4
42
5
38
2
11
29
37
Alexandra
36
Nevis
18
Kingston
Key to Soil Types of Trials
Trial Nos. Soils
1-6 Molyneux
7-10 Lowburn
11 Alexandra
12-23 Ranfurly
24 Drybread
25-26 Omarama
27-42 Idaburn
43-45 Becks
No. 34 is outside the boundaries of the map at the northern tip of Lake Wanaka.
Coal Creek Flat
45
Roxburgh
13
Miller's Flat
28
27

Map showing localities of trials.

are moderately well supplied with plant foods, and water is the main limiting factor in their utilisation.

10. Idaburn soils: These are developed on the river flats. They are very variable in texture and have little profile development. They are still subjected to occasional flooding and the water-table is often high. The fertility is high and irrigation is usually unnecessary.

11. Cromwell soils.

12. Becks soils: These are developed on the sandstones, clays, and quartz gravels that are old lake deposits. The soils are mainly heavy silt loams and clay loams and have a very strong structure due to their high clay content. They are often impervious and careful irrigation is required to prevent waterlogging of the surface layers. On the other hand they hold water for long periods. The presence of soluble salts in these soils must be taken into account when irrigation practice is considered.

Responses to Fertilisers

The table below shows the responses to fertilisers obtained in pasture topdressing trials conducted over a number of years on most of the soil types in Central Otago. The responses are recorded as points according to the scale: O, no response; ?, doubtful response; 1, slight response; 2, fair response; 3, good response; 4, very good response; and 5, excellent response.

In general, good responses were obtained from the use of superphosphate, but practically no effect was seen from the application of lime and potash, used alone or in combination, nor did their addition to superphosphate enhance responses.

Since 1935 there has been a considerable increase in the total amount of artificial fertiilser (mainly superphosphate) delivered at officered railway stations in Central Otago. In 1935 the amount delivered was 2480 tons and in 1950 this had risen to 4100 tons, indicating that in 15 years the consumption of phosphatic fertilisers in Central Otago had risen by about 65 per cent. This trend is well marked over the period, except during the war.

In 1935, 1364 tons of agricultural lime were delivered and in 1950, 8250 tons, indicating that there has also been an increased consumption of agricultural lime in the district. The results of the pasture-topdressing trials show, however, that little, if any, response can be expected from topdressing with lime.

		WITH LIME					NO LIME					
Soil type	Locality map No.	Super.	Serp. super.	Basic slag	Super. and potash	Potash	Super.	Serp. super.	Basic slag	Super. and potash	Potash	Effect of lime
Molyneux soils .	1	3			3	0	3			3	0	0
	2	2		1			2		1			0
	3	1		1	1	0	1			1	0	0
	4	?		?	?	0	?			?	0	0
	5	0			0	0	0			0	0	0
	6	3			3	0	3			3	0	0
Lowburn soils ..	7	?			?	0	?			?	0	0
	8	1			1	0	1			1	0	0
	9	3			3	0	3			3	0	0
	10	?			?	0	?			?	0	0
Alexandra soils .	11	½			½	0	½			½	0	0
	12	3			3	0	3			3	0	0
Ranfurly soils .	13	3½			3½	½	3			3	0	½
	14	2		2	2	1	1		?	1	0	1
	15	2			2	?	1			1	0	1
	16	1½			1½	½	1			1	0	½
	17	0		0	0	0	0		0	0	0	0
	18	1½			1½	0	1			1	0	½
	19	2			2	1	1			1	0	1
	20	1	1		1	1	0	0		0	0	1
	21					½					0	½
	22	1			1	½	½			½	0	½
	23	0			0	0	0			0	0	0
Drybread soils .	24						2			2	0	
Omarama soils .	25	?			?	0	?			?	0	0
	26	3			3	0	3			3	0	0
Idaburn soils ..	27	2			2	0	2			2	0	0
	28	1		?	1		1		?	1		0
	29	2			2	0	2			2	0	0
	30	3			3	2	3			3	?	0
	31	4			4	0	4			4	0	0
	32	4			4	0	4			4	0	0
	33	2			2	0	2			2	0	0
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	35	1½					0					1½
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	44	1			1	0	1			1	0	0
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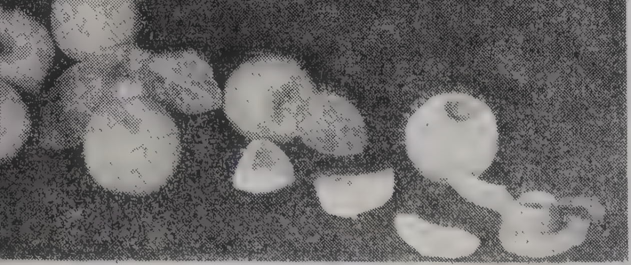
* In area of comparatively heavy rainfall near the northern tip of Lake Wanaka; position outside boundaries of map.



SERVING APPLES

RAW, COOKED, OR PRESERVED

By MOLLY MACPHERSON, Rural Sociologist, Department of Agriculture, Auckland

APPLES, which may be grown in every district of New Zealand, are relished by almost everyone and may be used in a variety of interesting ways, raw, freshly cooked, or preserved for all the year round.

PROBABLY originating in south Asia, apples were introduced to England by the Romans and are known to have been grown by the Greeks and Romans in 300 B.C. Though apples have been cultivated and used in England for more than 2000 years (there is a record that in 1296 apples were bought from France for a shilling a hundred), only in the past 500 years has there been much development of varieties. Now colour, size, and flavour vary widely.

Apples are important in the diet for their minerals and vitamins. The fruit has most food value when eaten raw, but to preserve as much as possible of its nutrient value it needs careful picking at the ripe stage, when stalks snap off easily with an upward movement, and careful handling to prevent bruising and spoiling. The surplus crop may be preserved for use at times of the year when fruit is scarce.

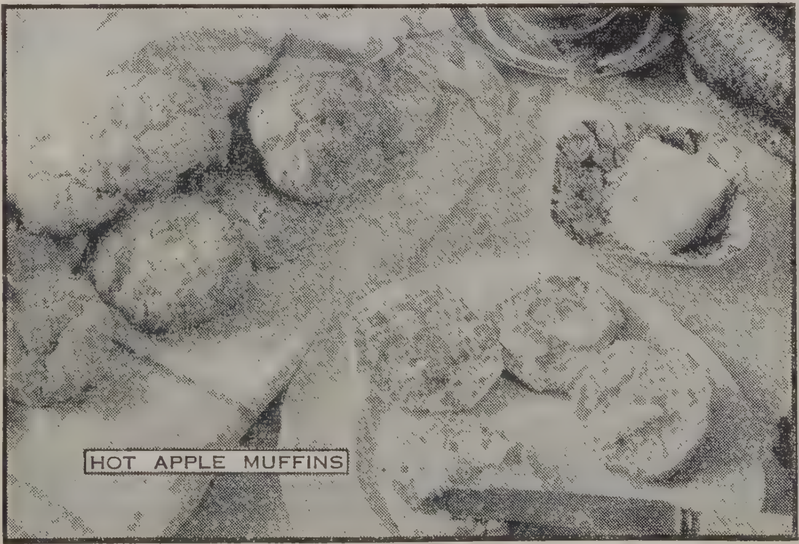
Storing, Bottling, and Preserving

If the apples are of a long-keeping variety, clean, unbruised fruit may be stored on wooden trays or shelves. They should not touch, as that hastens decomposition. The storage room should be cool and dark and have a circulation of fresh air to prevent sweating.

Jars to contain preserves or preserved fruit need to be sterilised. Either put them in a warm or cold oven, bring the temperature up to that of a slow oven (250 degrees F.), and leave them for 10 minutes, or cover the jars in a pan of warm or cold water, bring it to the boil, and boil them for 10 minutes.

Bottling apple slices: Sufficient syrup for 2 jars of apple slices requires 4 cups of sugar and 2 cups of water. Boil them to a syrup for 15 minutes. Peel and core the apples and cut them into eighths. Add the slices to the boiling syrup and cook them until they are tender, but do not mash them. Pack the slices into warm, sterilised jars. Fill the jars to overflowing with the syrup and seal them while they are hot. Bottled apple slices may be used in puddings, tarts, and pies.

Preserving apples: This method must be carried out in the open air. Line an airtight box about 14in. deep thoroughly with clean paper. Place half a brick in the centre of the bottom of the box. Peel, core, and slice the apples and place the slices in the box around the brick. Place a shallow tin filled with hot embers on the brick and sprinkle 1 tablespoon of sulphur over the embers. Cover the box well with papers and a sack or a rug immediately. Tie the sack over the box and leave it for 20 hours. Take the slices out, pack them in crocks or jars, and tie on dust covers. If the preserved apple slices are washed well, they may be used in recipes in the same way as raw apples.



HOT APPLE MUFFINS

APPLE GINGERBREAD

Cooking with Apples

Stewed apples: To 8 medium-sized apples use 1 cup of sugar and 1 cup of water. Peel and slice the apples and cook them until they are tender (about 8 minutes). Add the sugar when the apples have cooked for about 6 minutes. Lemon may be added for flavour, and a few drops of red food colouring lend variety. The quantity of sugar may be altered according to taste.

Cooking dried apples: To ½lb. of dried apples use ½ pint (1¼ cups) of water and sugar to taste. Wash the apple slices several times. Cover them with water and soak them overnight or until the fruit is soft. Cook the apples slowly in ½ pint of the liquid in which they were soaked.

Pressure cooking: Using the same quantities, dried apples may be cooked in a pressure saucepan in one of two ways: Either soak the slices for 1 hour in hot water and cook them for 3 minutes in the pressure saucepan with the liquid and sugar, or cook the apples for 5 minutes in the saucepan with the water and sugar. Whichever method is used, allow the saucepan to cool slowly before removing the lid.

Apple Cakes

Hot Apple Muffins

3 large cooking apples
1 teaspoon of baking powder
8oz. of flour
3oz. of butter or lard
2oz. of sugar
1 egg

Mix the baking powder and flour and rub in the butter. Add the sugar. Peel and grate the apples. Beat the egg well and add it to the dry ingredients with the grated apple. If the apples are very juicy, do not include all the juice in the mixture. Mix all the ingredients with a knife, adding a little excess apple juice or milk if the mixture is too dry; do not make it too wet, as the apples moisten it in baking. Roll out the mixture and cut it in the same way as for scones. Put the muffins on a greased shelf and bake them in a moderate oven (350 to 375 degrees F.) for ½ hour. Split the muffins open, butter them, dust them with icing sugar, and serve them hot.

BAKED APPLE

Lightning Apple Cake

1 egg
½ cup of sugar
1 cup of flour
1 teaspoon of baking powder
½ cup of milk
½ teaspoon of salt
3 tablespoons of melted butter
½ teaspoon of vanilla essence
½ teaspoon of lemon essence
2 medium-sized apples

Beat the egg, adding the sugar while beating. Stir in the flour sifted with the baking powder and salt. Add the milk, melted butter, and essences. Pour the mixture into two 7in. sandwich tins. Cover each with a thick layer of thinly sliced apples and sprinkle them with half white and half brown sugar and, if liked, cinnamon. Bake the cakes in a moderate oven (350 degrees F.) for 25 minutes.

This cake can also be used as a pudding.

Apple Gingerbread

½lb. of cooking apples
3oz. of sugar
4 tablespoons of golden syrup
3oz. of butter
6oz. of flour
1 egg
1 teaspoon of baking powder
1 teaspoon of ground ginger
½ teaspoon of ground cloves

Peel and slice the apples and cook them with 1 dessertspoon of sugar and enough water to keep them from burning. Mash the apples and leave them to become cold. Slowly melt the golden syrup with the butter and the remainder of the sugar and leave the mixture to cool. Beat the egg well, add the syrup mixture, and beat them together. Add the sifted dry ingredients, mix them well, stir in the apple pulp, and beat all the ingredients together. Bake the mixture in a well-greased small loaf tin for about ½ hour in a moderate oven (350 degrees F.). When the gingerbread is cooked let it stand before turning it out of the tin.

The loaf may be iced with cinnamon icing made from 6oz. of icing sugar and 1 level teaspoon of ground cinnamon mixed with 2 to 3 dessertspoons of boiling water.

Apple Squares

12oz. of flour
2 teaspoons of baking powder
2 tablespoons of milk
6oz. of sugar
2 eggs
2oz. of butter or lard
2 cups stewed or 3 cups thinly sliced raw apple
Icing sugar

Rub the butter into the sifted flour and sugar and mix in the beaten egg and the milk. Knead the paste with the hands and divide it into two. Roll and trim one half to a large square, place it on a greased oven shelf, and spread it with drained and mashed stewed apple or a generous layer of thinly sliced raw apple. Sprinkle the apples with the sugar and, if liked, ground cloves. Cover this square with a second rolled from the remainder of of the paste. Mark the top of the paste for cutting and prick squares on it with a fork. Bake the apple square in a moderate oven (350 degrees F.). Cut it into the smaller marked squares while it is warm. Cool the squares and sprinkle them with icing sugar.

Apple squares also make an attractive dessert when served with cream or custard.

Apple Puddings

Apple Mince Pie

3 or 4 large apples
2 tablespoons of golden syrup
A pinch of mixed spice
½ cup of currants, sultanas, or dates
Pastry to line and cover the dish

Peel and chop the apples and mix all the ingredients together. Line a dish with pastry, place the mixture in the dish, and cover it with more pastry. Bake the pie in a hot oven (450 degrees F.).

Baked Apples

Allow one well-flavoured apple per person. Wipe and core the apples. Make a circular cut around each apple through the skin to prevent the skin splitting. Almost fill the cored apples with dates or raisins and spice. Complete filling the core spaces with brown or white sugar and sprinkle sugar over the tops. Place a small piece of butter on top of the sugar. Put the apples in a baking dish and cover the bottom of the dish with boiling water. Bake the apples in a hot oven (400 degrees F.) until they are soft, basting them often with the syrup in the dish.

APPLE PAN DOWDY

Apple Pan Dowdy

Cake mixture:
2oz. of butter
1 egg, well beaten
1½ cups of flour
2 teaspoons of baking powder
2 teaspoons of salt
½ cup of sugar
½ cup of milk

Fruit mixture:
2 cups of sliced apple
¼ cup of golden syrup or brown sugar
¼ teaspoon of nutmeg
¼ teaspoon of cinnamon
¼ teaspoon of salt

Arrange the apple slices in the bottom of a buttered baking dish. Spread them with the golden syrup or brown sugar, the spices, and the salt. Bake the apples until they are soft.

While the apple mixture is baking cream the butter, adding the sugar gradually. Stir in the beaten egg. Add the sifted dry ingredients alternately with the milk to the butter, sugar, and egg. When the apple mixture is cooked pour the cake mixture over the hot apples and continue baking the pudding for ½ to ¾ hour in a moderate oven (350 degrees F.).

Serve the pudding with a custard from the dish, or turn it out upside down before serving it.

Apple Cinnamon Puffs

Syrup mixture:
5 medium-sized apples
1 cup of sugar
½ teaspoon of red food colouring
Puff mixture:
1½ cups of flour
1½ teaspoons of baking powder
½ teaspoon of salt
2oz. of butter or lard
¾ cup of milk
Sauce mixture:
2 tablespoons of melted butter
2 tablespoons of sugar
½ teaspoon of cinnamon

Peel the apples and slice them into a baking dish. Boil the sugar and the colouring with a cup of hot water for 5 minutes. Pour the syrup over the apples. Sift the dry ingredients, rub in the butter or lard. Mix in the milk to make a soft dough. Drop 12 spoonfuls of the dough on top of the apples.

Pour the sauce mixture into dents in the tops of the balls of dough.

Bake the puffs for ½ hour in a hot oven (450 degrees F.).

Apple Dumplings

6 apples
1¼ cups of sugar
½ teaspoon of ground cloves
2 cups of flour
½ teaspoon of salt
5oz. of butter
⅓ cup of milk

Boil the sugar and cloves to a syrup in 2 cups of water for 5 minutes and add 2oz. of butter.

Peel and core the apples and fill them with dates, or slice the apples. Sift the flour and the salt, rub in the remaining 3oz. of butter or lard, and mix them to a paste with the milk. Roll the paste to ¼in. thickness and cut it into 8in. squares. Place an apple or slices in each square, sprinkle them with sugar and spices, and dot them with butter if desired. Moisten the edges of the paste, fold it up, and pinch the edges together.

Place the dumplings in a greased baking dish and pour the syrup over them. Bake them in a moderate oven (375 degrees F.) for 35 minutes.

Steamed Apple Pudding

4 apples, sliced
1 tablespoon of sugar
¼ teaspoon of nutmeg
½ teaspoon of salt
Scone mixture

This pudding can be made in one of three ways: Put the scone mixture on top of the other ingredients in a bowl; roll out the scone mixture, place the other ingredients in the centre, bring the dough around them, and lift the whole into a buttered bowl; or roll out the scone mixture, sprinkle the other ingredients over it, roll the whole up as for a jam roll, and place it in a buttered bowl. Steam the pudding for 1½ to 2 hours.

Apple Tapioca

½ cup of tapioca
Pinch of salt
6 apples
½ cup of sugar

Boil the tapioca with the salt in 2½ cups of water until the tapioca is clear. Core and peel the apples, fill the core spaces with sugar, and put the apples in a buttered dish. Pour the cooked tapioca over them. Bake the pudding in a moderate oven (350 degrees F.) until the apples are soft.

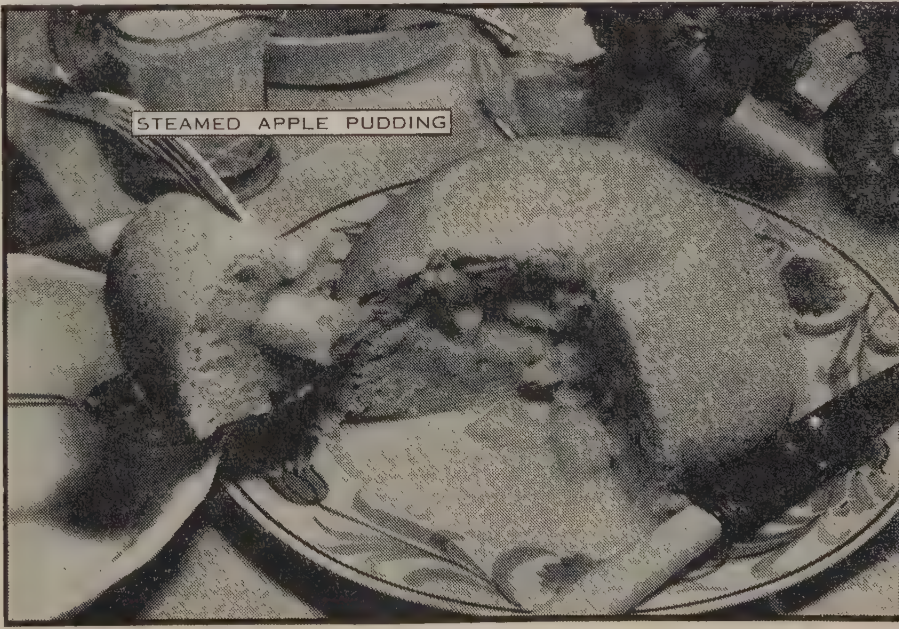
Apple Preserves

Jars for preserves should be sterilised as described on page 147.

Apple Jam

6lb. of apples
4½lb. of sugar
6 lemons or 1 tablespoon of cinnamon

Peel and core the apples and cut them into thick slices. Put an inch of water into a jam saucepan, add the apples, and cook them until they begin to soften. Add the sugar and the juice and finely grated rind of the lemons or the cinnamon. Boil the jam for 40 to 50 minutes, stirring frequently to prevent it from burning. If it is too dry, add a little more water.


STEAMED APPLE PUDDING

The jam should be thick. Test it by putting some on a cold saucer; if a skin forms, the jam is cooked. Pour the jam into sterilised jars and cover it with melted wax and airtight seals.

Because they contain pectin, apples are useful in jam making for combining with fruits which set poorly—for example, strawberries—as apples do not alter the flavour of the other fruits.

Apple and Raisin Relish

8 large apples
4 sticks of rhubarb
1 cup of raisins
4 large onions
1 quart of vinegar
½ teaspoon of pepper
½ teaspoon of ground cloves
½ teaspoon of ground ginger
½ teaspoon of ground mixed spice
3 cups of sugar
4 teaspoons of salt

Boil the vinegar, salt, sugar, and spices to a syrup. Peel the onions, peel and core the apples, and wipe the rhubarb. Mince the apples, rhubarb, onions, and raisins, put them all into the syrup, and simmer the relish for 1 hour. Pour it into hot sterilised jars and, when it has cooled a little, cover it with melted paraffin wax and airtight seals.

Windfalls or green apples may be used.

Apple Sauce

4lb. of apples
½oz. of cloves
½oz. of allspice
1lb. of onions
2 quarts of vinegar
2lb. of brown sugar
2oz. of salt
½oz. of ground ginger
A pinch of cayenne (optional)

Wipe and slice the apples without skinning or coring them. Put the cloves and allspice in a muslin bag. Boil all the ingredients together for 3 hours. Remove the bag of spices and strain the sauce through a colander. Pour the sauce into sterilised bottles and cork them.

APPLE FRITTERS

Miscellaneous Recipes

Apple Fritters

1½ cups of flour
2 tablespoons of sugar
1 cup of milk
1 teaspoon of baking powder
4 medium-sized apples

Sift the dry ingredients and stir in the milk until the batter is smooth. Peel and core the apples and slice them ⅓in. thick. Dip the slices in batter and fry them a golden brown, turning them when necessary. Drain the fritters, sprinkle them with sugar, and serve them hot.

Mincemeat

¼lb. of suet
½lb. of apples
½lb. of currants
¼lb. of raisins
1oz. of peel
¼lb. of sugar
1 level teaspoon of spice
½ level teaspoon of cinnamon
1 tablespoon of brandy

Peel and core the apples and mince them with the other fruit. Add the sugar, spices, grated suet, and brandy. These quantities make three-quarters of a quart preserving jar of mincemeat, which may be cooked in pies and tarts.

Apple Stuffing for Duck

Five tart apples and a medium-sized onion make enough stuffing for one duck. Peel the apples and onion, cut them in small pieces, and add a pinch of salt and pepper to taste.

One of the apples may be replaced by ½ cup of chopped celery and some parsley.

Apple Barley Water

2oz. of barley
2 sliced apples
Pinch of salt
½ cup of sugar
1 or 2 lemons

Simmer the barley and apples, including the peel and cores, in 2½ quarts of water for 2 hours. Strain the liquid off and add the sugar and salt. When the liquid is cold add the lemon juice.

Apple Vinegar

Boil 3 gallons of water and let it cool. Wipe 7lb. of apples and mince them without peeling or coring them. Pour the water over the minced apple in an enamel dish or earthen jar, stir the mixture well, and let it stand for 7 to 10 days, stirring occasionally. Strain the liquid off the apples and add 4lb. of sugar to it. Cover the jar tightly and leave the vinegar for 8 to 10 months before using it.

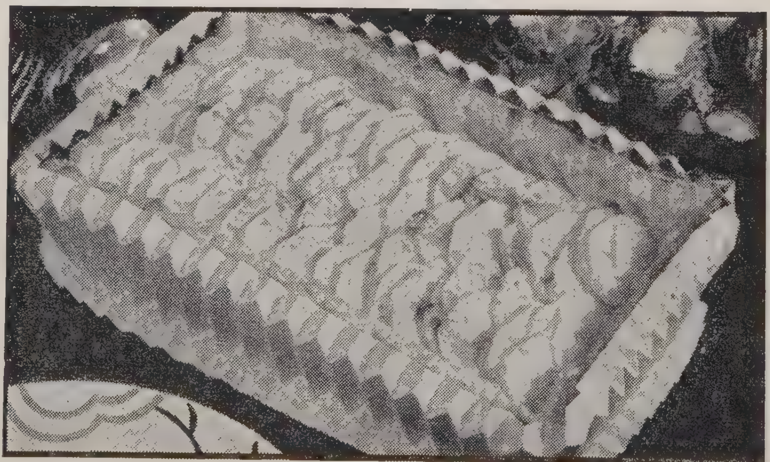
Applet Sweets

2 cups of unsweetened stewed apple
2 cups of sugar
2 tablespoons of gelatine
A few drops of lemon essence
1½ cups of chopped nuts (optional)
Icing sugar

Sprinkle the gelatine on ½ cup of cold water and let it stand. Sieve the stewed apple, add the sugar, and cook the mixture until it is very thick (about 10 minutes) or until when it is dropped from a spoon into very cold water it forms a soft ball. Remove the saucepan from the heat, add the gelatine mixture, essence, and nuts, and stir well. Pour the mixture into a dish 8in. square and leave it to stand until it is firm. Cut it into squares and roll them in icing sugar.

Photographs by Sparrow Industrial Pictures Ltd.

Dutch Flan: A Special Apple Recipe

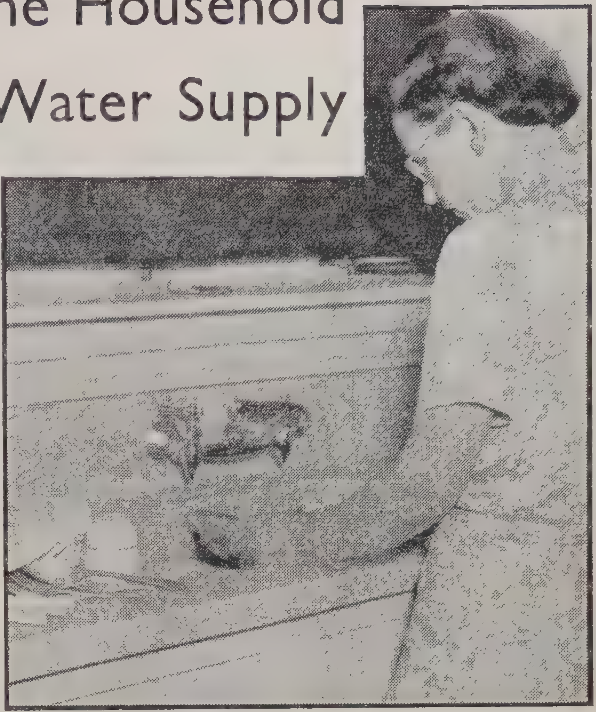


ROLL out ½lb. of short pastry to an oblong and line a shallow tin with it, fluting the edges between finger and thumb. Spread the surface of the pastry with a heaped tablespoon of jam and cover that with even rows of overlapping slices of peeled apples; 3 or 4 large cooking apples will be needed. Sprinkle the top thickly with sugar, add a squeeze of lemon juice, and bake the flan in a hot oven for ½ hour or until the pastry is crisp at the edges and lightly browned. Serve it with a dusting of castor sugar and a custard sauce.

Making the Best Use of the Household Water Supply

By EVELYN E. MOORE, Rural Sociologist, Department of Agriculture, Palmerston North

ONE of the first requisites for a convenient farm home is a water supply satisfactory both in quality and quantity. Where sufficient provision for rain-water storage cannot be made creek or river water, which is usually soft, generally can be made suitable for household use. If this is not available, however, it may be necessary to use well or spring water, which is often hard and therefore unsatisfactory for many household purposes.



IN this article the causes of hardness and the deleterious effects of hard water are described, and the methods that may be used to overcome its defects for the maintenance of an efficient hot-water service or for home laundering or cookery are discussed. Some types of treatment involve considerable initial outlay, but the householder is able to recoup expenses to some extent by the saving of soap, fuel, or electricity, by the reduced cost of maintenance of hot-water pipes, and by reduced wear and tear on clothing.

Causes of Hardness

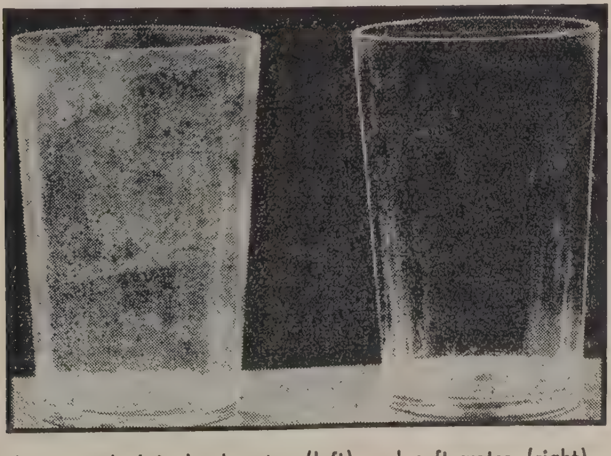
Hardness in water—defined scientifically as its soap-destroying power—is caused by mineral salts dissolved in water which has flowed over or through layers of limestone or other slightly soluble rocks. Salts of lime and magnesium are responsible for hardness which, according to the nature of the salt, may be "temporary" or "permanent"; sometimes both types may be present together in the one water supply.

The hardness due to dissolved bicarbonate salts is called temporary because it is removed when the water is boiled, the salts being deposited as a chalky sediment and sometimes as scale in boilers, kettles, and hot-water pipes. Permanent hardness is caused by small amounts of salts of calcium (lime) other than bicarbonate salts and magnesium dissolved in the water, and is so called because it is not removed by boiling.

Effects of Hardness

The salts responsible for permanent hardness help to form the scale on heating elements in boilers and in hot-water pipes, which slowly become blocked, making costly replacements necessary. This scale also reduces considerably the heating efficiency of boiler elements and kettles, and electricity is wasted, so that during periods of rationing the boiler fails to heat properly with the amount of electricity allowed. The dissolved mineral salts causing hardness are also very wasteful of soap, because they combine to form a scum of flaky insoluble lime soap, which quickly floats to the top of the water and which will be all too familiar to the users of hard water.

This lime soap is slightly sticky and therefore makes all types of cleaning where soap is used more difficult. It clings to fabrics and absorbs the dirt, leaving on everything a greyish film the removal of which causes considerable extra wear and tear. Similarly, it makes smears on plates and glasses, it clings to the skin and hair, and may be responsible for the formation of a rash on the skin of babies or for dull, lifeless hair, and when rubbed off on tea, hand, and bath towels it makes cleaning of them especially difficult.



Glasses washed in hard water (left) and soft water (right).

That much soap can be wasted by the formation of the lime soap is shown by the fact that each part of mineral causing hardness present in water requires about 10 parts of soap for its removal, and the soap will not lather or be available for washing until all the hardness has been removed.

Hard water is also a problem in the cooking of green vegetables and peas, beans, and dried legumes, as it tends to toughen them and lengthens the cooking time.

Removal of Hardness

There are two alternatives for softening water available to the average householder. He may install a water-softening plant, which ensures a continuous supply of softened water at very low cost after the initial expense, or he may choose to soften water only for certain purposes—laundering for example—which saves the cost of installation of water-softening plant, and soap, but does not deal with the problem of scale formation on pipes, boilers, or kettles. Which method the householder decides to use will depend on many factors; if he considers installing a water-softening plant, for example, the advice of an analyst is essential, as points other than the degree or nature of the hardness have to be considered.

The following discussion, however, explains various methods of softening and will, it is hoped, show the advantages and limitations of each method. The principle involved is the same in each case, chemical action taking place between the salts causing the hardness and the softener, so that an insoluble substance is formed and either precipitated in the water as a chalky deposit and made harmless or, as in the water-softening plant, removed from the water, leaving an equivalent amount of harmless salt in solution.

The installation of a water-softening plant is more expensive initially, but it has several advantages over other methods, as all the water is softened and made suitable for household purposes.

Types of Water-softening Plants

There are two main types of water-softening plants. The first, although manufactured and sold under more

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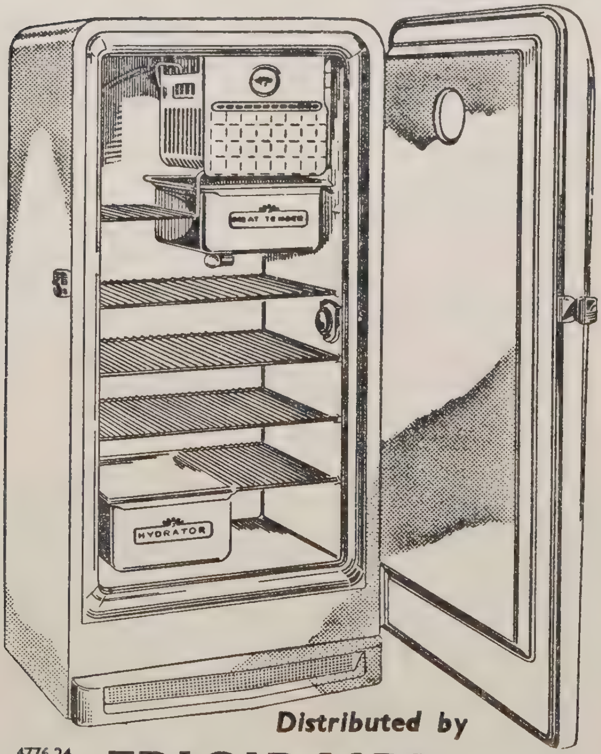

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than one trade name, is known generally as the zeolite-exchange method. It is simple and efficient to operate and the cost of upkeep is low. In principle the hard water is passed through a cylinder containing certain chemicals called zeolites, which are capable of exchanging the part of the dissolved minerals causing hardness, that is, calcium and magnesium, for sodium, leaving an equivalent amount of the soluble and harmless sodium salts dissolved in the water. With proper precautions and suitable water no scale is formed and no corrosion of pipes or boilers occurs. It is necessary to regenerate the zeolite by passing a strong salt solution through the cylinder when the sodium in the salt (sodium chloride) replaces the magnesium and lime. As a coarse commercial grade of salt only is required for the brine, the cost of replacement or regeneration is small and the process takes only about 45 minutes every 2 to 4 weeks.

Zeolite plants also help clear cloudy water, as the softening mineral is a granular material and any dirt or sediment in the water is removed and collected on top of the cylinder of material as the water filters through. When the zeolite is to be regenerated —depending on the hardness of the water—the flow of water is reversed and forced up through the material, agitating and cleaning it and removing the layer of sediment. The measured amount of strong brine is then introduced at the top for regenerating the material in the cylinder. To make the softening operation as simple as possible most plants consist of two cylinders, one attached to the other containing the strong brine, and so fitted that a large, clearly marked operating wheel is simply turned to any one of the four marked positions for the appropriate action to be carried out. It is important that the zeolite be regenerated at the correct times, as if it is left too long it can lose its activity.

The limitation of these plants is that they cannot be used unreservedly with all types of water, including water containing iron or having high temporary hardness. A laboratory analysis of the water is therefore essential before the plant is installed. A disadvantage for some people is the initial cost of installation, although this is recompensed by various savings, such as of soap and fuel.

A soap lather from hard water (left) and soft water (right).

Zeolite water softeners, if installed and used properly, will ensure a permanent supply of soft water for a low upkeep, and very little work has to be done to maintain them. They will be unsatisfactory only when they are used under unsuitable conditions.

Lime-soda Process

Another method of softening water is the lime-soda process, which is suitable for a wide range of types of water. A solution of slaked lime is added to the water and the salts causing hardness are deposited as a chalky sediment, leaving the water soft. If the water contains permanent hardness, some soda ash or washing soda solution must also be added. It is necessary, however, to add exact amounts of lime and soda ash to a definite volume of water if the water is to be softened properly. Provision is also needed for sufficient agitation to mix the lime and soda thoroughly with the water, after which the sediment has either to be filtered off or settled out in a tank. Although this method is cheaper than the zeolite process, it is more time consuming, and unless the procedure is carefully controlled, the method may not be satisfactory, but it may be used to soften water for which the zeolite process would not be suitable.

Softening Laundry Water

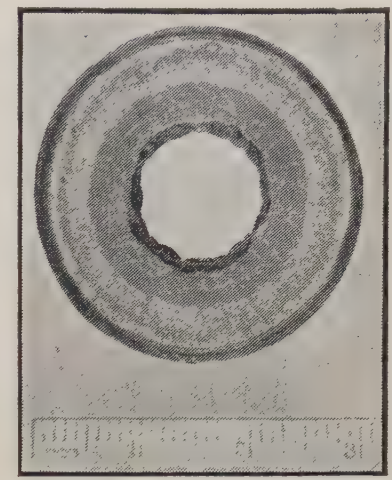
It may be decided that the water available is not sufficiently hard to warrant the cost or time involved in the installation of water-softening equipment. In such circumstances considerable benefit will be obtained if water is softened regularly for laundry purposes.

At present washing soda is the most suitable substance easily available to the housewife, although soda ash, if it is obtainable, is more convenient to use. Added to hard water, washing soda causes the formation of an insoluble chalky residue which is easily rinsed from clothes (unlike the insoluble lime soaps formed when no soda is added) and less soap is used.

However, washing soda must be added to the water before the soap; otherwise lime soaps are formed first.

High temperatures assist the softening process; washing soda softens cold water in 1 hour, water at 100 degrees F. in 10 minutes, water at 140 degrees in 1 minute, and boiling water in about 15 seconds, but soap softens it (by forming the undesirable lime soaps) instantaneously, so that unless the washing soda is added first, even to boiling water, its softening power is wasted. Thus soap powders, the majority of which consist of a mixture of washing soda and soap, must be used in conjunction with additional washing soda when the water is hard, if they are to be fully effective.

The amount of soda that should be added to remove hardness depends on the hardness of the water, but as it is not important if a slight excess is added, the housewife will find that the addition of 1, 2, or 4 level tablespoons of washing soda to a copper or washing machine about three-quarters full of water, for slight, moderate, or severe hardness, respectively, will be sufficiently accurate. If after soda is added the typical scum still forms on top of the water and lathering is poor when the soap is added, an extra tablespoon of soda should be used the next time the washing is being done.



A cross-section of a pipe, showing scale deposit from hard water.

Saving of Soap

A copper of water of moderate hardness (containing about 10 grains of lime salts per gallon of water) will require 1oz. of washing soda to make it as soft as rain-water, and this would save almost 2oz. of soap. If water contains 20 grains of lime salts per gallon, twice as much washing soda is required and twice as much soap is saved. As several New Zealand town water supplies have more than 10 grains of lime salts per gallon, and up to 26 grains per gallon occurs, it is probable that there are many farm homes throughout the country where water softening is advisable.

Other water-softening chemicals of varying efficiency have been developed and used in other countries, but small quantities have reached New Zealand and these are absorbed mainly by commercial laundries and other wholesale buyers, so that they are not available generally to housewives.

This article has discussed some of the ways in which the inconveniences of a hard water supply can be overcome, but there are also acid water supplies and iron-containing water which may cause considerable trouble to the housewife by corroding pipes and boilers and by leaving unpleasant iron stains on clothing. These, too, can be treated by a method which will be described in a subsequent article.

◆

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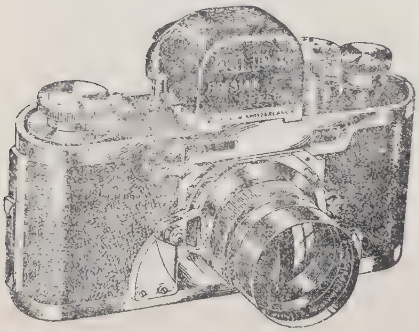

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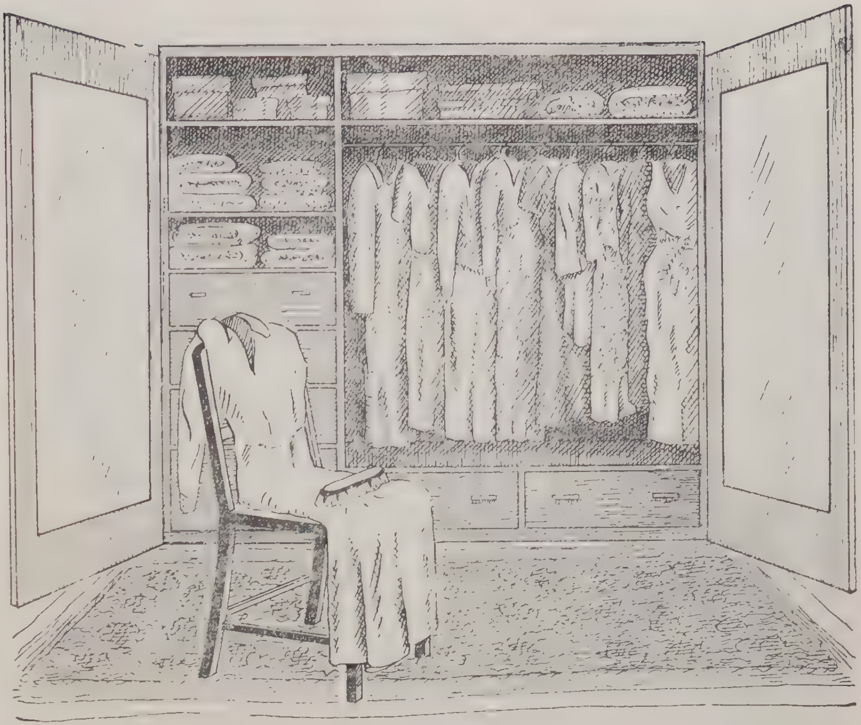
Care of Wool Clothing

WOOL garments deserve the best care that can be given them, yet wool has such natural resilience and wearing qualities that little attention is necessary to keep wool suits, dresses, and jerseys smart and new looking. However, that little should be done regularly, and the hints that follow are most effective when they form part of a daily routine of clothes care. The hints apply mainly to woven wool fabrics; wool knitwear, being constructed in one continuous thread, often requires different treatment, and it is dealt with separately.

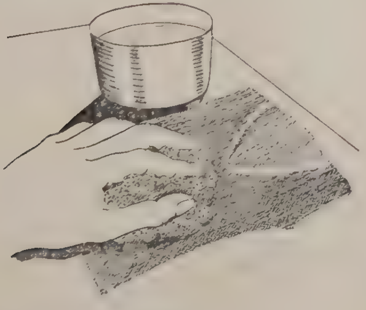
BECAUSE of its unique surface texture, wool is revived quickly by careful brushing. A soft but firm brush should be used to remove all dust and gently lift the wool fibres back to their natural springiness. Almost invisible specks of dust hide away in such places as under collars, lapels, revers, and pleats, and these places should receive special attention. Daily brushing can do wonders in preserving the fresh appearance of any wool garment and will add considerably to its life.



Resistance to Wrinkles

If a wool garment becomes creased, it need only be hung properly on a hanger, with plenty of air round it, and the naturally resilient fibres get rid of the wrinkles by themselves. Covered hangers are best, and they should be thick and wide enough to extend across the shoulders to both sleeve seams, so that garments may hang in natural folds.

Wool clothing benefits greatly by being hung where air circulates freely immediately it is taken off, for wool and air are natural partners. If garments are wet or muddy, they should be hung in the air away from direct heat; mud will brush off easily when the wool is dry. Wool clothing well repays special brushing and shaking in the sun every few weeks. Most spots can be removed from wool easily if treated at once with warm water and a soft sponge.



Storage of Clothes

Clothes are all the better for an occasional rest, so, after being brushed and aired, wool garments should be put away in a roomy wardrobe or cupboard for at least 24 hours. Wearing them in turn allows the natural elasticity of wool to assert itself; wrinkles vanish as each tiny thread eases back to its original shape and size. A wardrobe should never be overcrowded and the door should shut tightly.

Packing for Long Storage

Wool does not crush easily and, even if creased by careless packing or folding, soon recovers its normal appearance, but when clothes are to be stored for any length of time it is obviously sensible to pack them carefully. After all spots and stains have been removed, the best plan is to make up a parcel, using heavy paper and sealing the ends with gummed strips to keep out dust and moths.

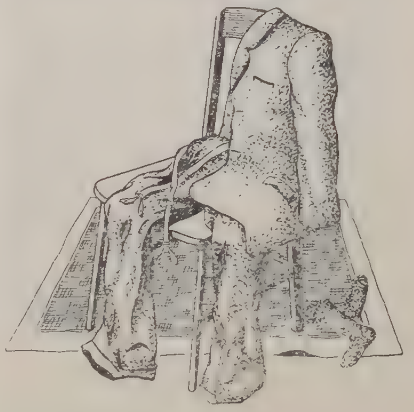
Treatment of Knitwear

Brushing is not suitable treatment for knitted fabrics. Such garments are best shaken gently after each wearing and reshaped by drawing the sleeves into place and adjusting neckline, wrists, and waist. Then they can be spread out flat on a bed or a chair and given a good airing.

Knitted dresses are particularly durable, but careful hanging is advisable to prevent stretching of the stitches and consequent loss of shape. If a dress is closely knitted, it can be hung with the shoulders straight on a wide-shouldered hanger and the skirt drawn over the rod of a second hanger, or the whole dress can be hung over the hanger's cross-bar with the weight equally balanced over the rod. If the dress is too wide for the hanger, it may be folded once lengthwise, but knitted garments are always best laid out flat.

Care of Men's Clothes

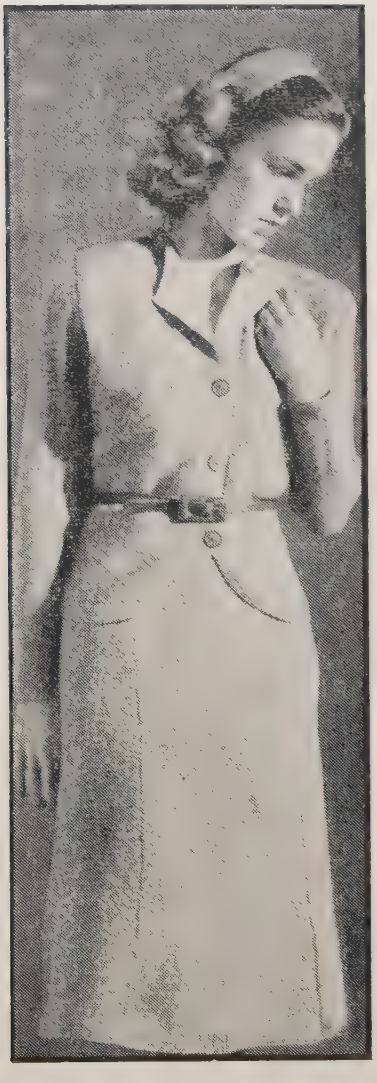
Men are often the worst offenders in the treatment of clothes. Pockets stuffed to bulging point with keys, change, and assorted masculine sundries, coats and trousers thrown anyhow over a chair—wool can put up with a great deal of such treatment, but there are limits.



Pressing and cleaning are sometimes necessary, but they should not be a substitute for regular daily care. Wool is quite capable of looking after normal wrinkles and creases if given a chance. Regular brushing, particularly behind the lapels, in seams, and under trouser turn-ups, is very important. With careful folding and hanging, wool will keep perfect shape and fit. A narrow strip of strong material sewn inside the legs of trousers where they rub against shoes prevents wear.

A 24-hour rest gives the wool fibres a chance to recover and adds greatly to the life of the suit, so one suit should be worn one day and another the next. If possible, a slack suit should be kept for changing into after work. Felt is wool, so regular brushing and an occasional rest are as good for hats as for suits and overcoats.

Two-piece Autumn Suit in Basket Weave Stitch



INSTRUCTIONS for making the comfortable 2-piece autumn suit illustrated are given in this article. It is worked in an all-over basket weave stitch with ribbed edges.

MATERIALS: 1¾lb. of 3-ply knitting wool, 1 pair each of Nos. 9, 10, and 12 knitting needles, ¾yd. of elastic, and 4 buttons.

Measurements: Skirt, length 27in. to fit up to a 38 hip measurement. Coat, length from shoulder, 21in.; width all round under the arms, when fastened, 35in.; sleeve seam, 17½in.

Tension: 10 sts. and 9 rows to 1in., on No. 10 needles.

Abbreviations: K., knit; p., purl; sts., stitches; rep., repeat; tog., together; inc., increase; dec., decrease; patt., pattern; beg., beginning.

Skirt

With No. 9 needles cast on 110 sts. and work 1in. in k. 1, p. 1 rib, then work in patt. as follows:—

First row: K. 1, * k. into the back of 2nd st., k. the first st., then slip both sts. off needle. Rep. from * to last st., k. 1.

Second row: K. 1, p. 1, * p. into front of 2nd st., p. the first st., then slip both sts. off needle. Rep. from * to end. These 2 rows form one patt. Continue in patt. until work measures 3½in. from beg., then dec. 1 st. at both ends of next row, and every following 13th row until 82 sts. remain. Now dec. 1 st. at both ends of every 11th row until 78 sts. remain, after which dec. 1 st. at both ends of every 9th row until 66 sts. remain. Continue without shaping until work measures 27½in. from beg. Cast off. Make three more panels in the same way.

Coat

Back

With No. 10 needles cast on 154 sts. and work in patt., but dec. 1 st. at both ends of 9th row and every following 6th row until 142 sts. remain. Now inc. 1 st. at both ends of every 6th row until there are 174 sts. Continue without further shaping until work measures 14in. from beg.

Armhole shaping: Cast off 6 sts. at beg. of next 4 rows, then dec. 1 st. at both ends of every row until 112 sts. remain. Continue without further shaping until work measures 20in. from beg.

Shoulder shaping: Cast off 9 sts. at beg. of next 8 rows. Cast off remainder.

Right Front

With No. 10 needles cast on 46 sts. and work 2 rows in patt. Continue in patt., but cast on 4 sts. at beg. of next and every alternate row until 28 sts. have been cast on, but at same time dec. 1 st. at side edge on 9th and every following 6th row until 6 dec. rows have been worked. Now inc. 1 st. at side edge on every 6th row until there are 84 sts. Continue without further shaping until work measures 14in. from beg., ending at side edge.

Armhole shaping: Cast off 6 sts. at beg. of next row, and next alternate row, then dec. 1 st. at same edge on every row until 56 sts. remain. Keeping armhole edge straight, shape front edge as follows: take 3 tog. at front edge on next row and every following 4th row until 36 sts. remain. Continue without further shaping until work measures 20in. from beg., ending at armhole edge.

Shoulder shaping: Cast off 9 sts. at beg. of next row and next 3 alternate rows.

Left Front

Work as given for right front, but with all shapings at opposite edges.

Sleeves

With No. 10 needles cast on 70 sts. and work in patt. for 1in., then continue in patt., but inc. 1 st. at both ends of the next row and every following 6th row until there are 124 sts. Continue without further shaping until work measures 16½in. from beg., then shape top thus: cast off 4 sts. at beg. of next 4 rows, then cast off 2 sts. at beg. of every row until 48 sts. remain. Cast off.

Coat Edging

With No. 12 needles cast on 12 sts. and work in k. 1, p. 1 rib until edging reaches from side edge of right front to 2in. above last set of cast-on sts., then make a buttonhole thus:—

Next row: Rib 4, cast off 4, rib 4.

Next row: Rib 4, cast on 4, rib 4.

Continue making buttonholes 3in. apart until there are 4 in all, then continue in ribbing until edging is long enough to go all round edge of coat to right edge of back. Cast off ribwise.

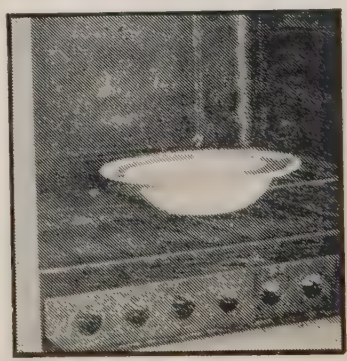
Sleeve Edgings

With No. 12 needles cast on 12 sts. and work 6in. in k. 1, p. 1 rib. Cast off ribwise.

Making-up

Press work on the wrong side with a warm iron and damp cloth. Join the skirt panels together, and press the seams. Make a ½in. hem at top of skirt, then thread the elastic through the hem. Join shoulder seams of coat, then sew in sleeves, making a pleat at each side of shoulder seams. Sew up side and sleeve seams. Sew edging all round coat, placing buttonhole edge to right front. Sew edging round sleeves. Press all seams. Sew on buttons to correspond with buttonholes.

Removing Grease Stains from Oven



TO remove the grease stains from the inside of an oven leave a flat dish (saucer or soup plate) of ammonia in the bottom of the oven overnight. The ammonia fumes will loosen the grease so that it can be cleaned off easily. If there is much grease on the sides of the oven, it may be necessary to repeat the process.

—*HELEN PAINE, Rural Sociologist, Department of Agriculture, Wellington*

Flower-garden Maintenance for Year-round Display

THERE are few areas in New Zealand where most borders cannot be maintained in such a way that they provide an interesting variety of flowers throughout the year. That is not wholly because most places enjoy a reasonable amount of winter sunshine and moderate temperatures, for without continuous attention and a lot of routine work no garden can give of its best. In this month's article for the flower gardener C. K. Ellis, Horticulturist, Department of Agriculture, Dunedin, discusses general late-summer garden maintenance.

[R. W. Orr photo.

Roses are gross-feeding plants and, though low-growing plants may be used as an edging around the beds, it is not wise to grow other heavy-feeding plants among roses.

BUDDING can be continued as long as the bark lifts readily. Ties round the buds should be loosened immediately the buds appear to have taken.

Bulb planting is probably the biggest of the gardener's tasks for March to ensure a good spring display. Most bulbs should be planted with their tops about twice the diameter of the bulbs below the surface, but tulips prefer to be planted rather deeper where they may be left in the soil for more than 1 year. Tulips, hyacinths, and daffodils should be planted 6 to 8in. apart for a good display and the smaller bulbs should not be set in more than 6in. apart. Soil must be well drained for bulb culture, for the roots of most bulbous species will not tolerate waterlogging; areas likely to be very wet during winter should not be used for bulbs.

Chrysanthemums are among the showiest of autumn flowers and give a long display of colour after most other plants have finished. The type of display depends largely on whether the plants are disbudded as described last month; disbudded plants give fewer but finer flowers than those left to their own devices. Personal preference is the only guide. Chrysanthemums grown in pots in cold districts should always be taken indoors before there is risk of hard frosts, which are likely to destroy the developing flowers. Even in sheltered districts it pays to protect pot-plant chrysanthemums from strong and cold winds, which may damage petals if the flowers have opened. Chrysanthemum plants can be lifted from the border and placed in pots provided the operation is done carefully and 4 to 5in. of soil are retained all round the stems. They should be wrenched about a week before it is intended to pot them. After being lifted they can either be potted and placed indoors or replanted into soil in a glasshouse. Some of the dwarf varieties now fairly widely grown are worthwhile plants for indoor decoration, but they should not be moved into the house before the flowers are fully open, for if the flowers are allowed to develop under normal house conditions they do not produce their best in colour.

Cuttings which can still be rooted include those of violas, pansies, antirrhinums, geraniums, many shrubs, pentstemons, and verbenas. Root-promoting hormones, which increase the range of plants which can be propagated at home, are most effective when applied to leafy shoots. They are not particularly effective on hardwood cuttings of deciduous trees. Hormones are chemicals of which only the minutest quantities are required and they should never be used other than according to the maker's instructions.

Dead flower heads should be removed regularly from all flowering plants to prolong the display of flowers as far into autumn as possible. Removing of dead heads is not the dull task that many people appear to think it, but may be really interesting to the gardener who is sufficiently observant to notice the differences in growth forms and systems in his flowering plants. He is the gardener who learns to appreciate his plants both in flower and in foliage and ultimately derives infinitely more pleasure from his hobby than he who sees beauty only in flowers. Weekly removal of dead blooms should be considered an essential of garden maintenance and should never be neglected regardless of what other work is to be done. It takes very little time if a bucket is carried and the dead heads are dropped in it immediately they have been removed. The material is quite useful as an addition to the compost heap.

Dwarf conifers can be used to excellent effect in home gardens, and the study of their use for landscape work is probably one of the greatest contributions to domestic horticulture. However, the value of dwarf conifers is not fully appreciated in New Zealand, which is rather surprising, because they can be used for many purposes, require very little maintenance, and almost invariably look tidy. They show foliage colours varying from bright yellow through many shades of green to glaucous blues and forms of habit varying from the tall columnar type to prostrate mats of foliage suitable for covering retaining walls or large expanses in rock gardens. Dwarf conifers are extremely useful for planting close to buildings, where the columnar types in particular can break up hard horizontal lines and add beauty to architectural features.

Gladiolus corms which were lifted earlier can be cleaned, the outer skins and foliage probably being dead by now. Each stem should be cut off about ½in. above the new corm and the old corm pulled away. The corms and cormlets should then be put away for the winter in a cool, dry, airy place. The corms are best stored with their outer skins still on; these should not be removed until just before planting time. Gladioli still in the ground should be lifted as the foliage shows a marked change in colour, which usually occurs 6 to 8 weeks after the flowers have faded. The seed pods of gladioli which have been cross-fertilised for production of new varieties should be left on the plants until they are nearly ripe and picked at the first sign of splitting. The pods may be ripened on a sunny windowsill for a few days and then have the seeds shaken out and sown at once in seed-sowing soil about ¼in. deep. A good soil mixture for this purpose consists of 7 parts of loam, 3 parts of leaf mould, and 1 part of finely sieved sharp sand.

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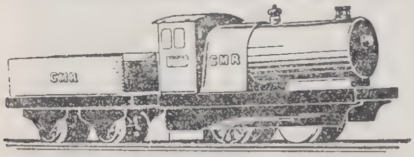

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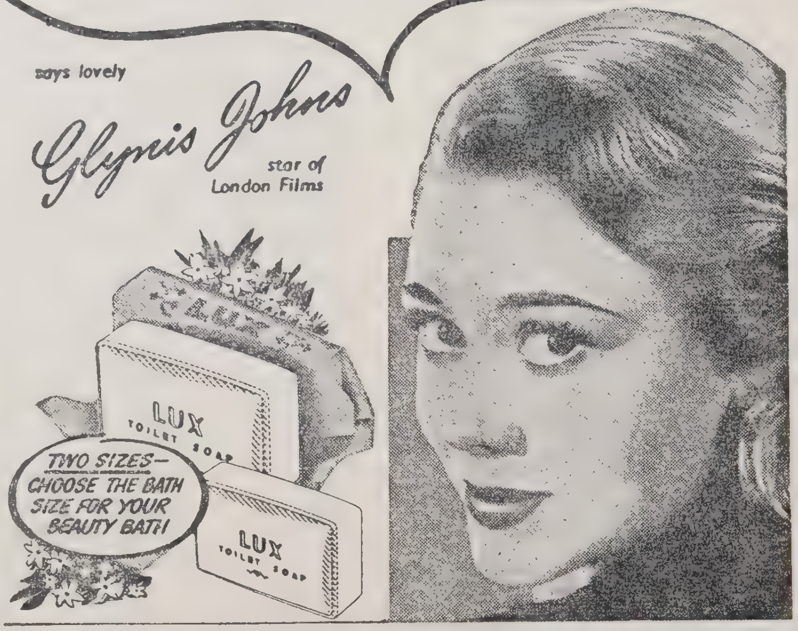
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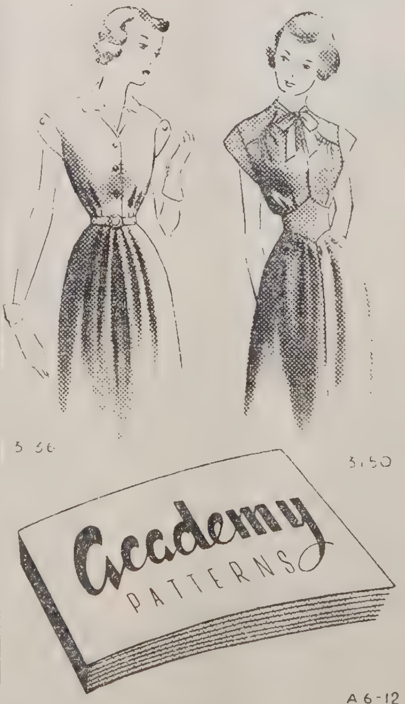
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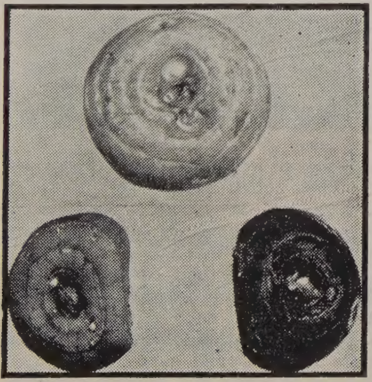
Hydrangeas can be spoiled by hard pruning during winter, which results in the loss of all flower buds which should flower early in summer. By good pruning hydrangeas can be kept shapely, neat, and well clothed with flowers borne on long, straight stems suitable for cutting during summer and autumn. For best results the plants should be gone over in late summer when the main show of flowers is over. All weak shoots should be cut out first, and then all shoots which have flowered should be removed provided plenty of new shoots are growing up from the centre of the bush. If the new shoots are few, all those which have flowered should be retained, but each should be shortened by removing the flower head and at least 3 or 4in. of the woody growth behind it. Unless the bush is very crowded, the new shoots should never be cut out or shortened, as they bear flower buds for the following year and any pruning reduces the number of flowers borne. Hydrangeas should not be pruned until spring in districts which are likely to experience heavy winter frosts, and the old stems and even the faded flower trusses should be left to give protection from frosts to the new shoots and buds below.

Lawns are best sown in most parts of New Zealand during March, late in the month in the North Island and earlier in the colder parts of the South Island, though sowing may have to be delayed if the season has been hot and the soil is still dry. In areas subject to autumn and winter droughts or to severe late-autumn and early-winter frosts spring sowing of lawns is undoubtedly better, though annual weeds frequently are troublesome in spring sowings. An area to be autumn sown should be prepared finally in March by raking the surface level when the soil is in a condition to work down to a fine tilth, but not more than ½in. of loose soil should overlie the consolidated soil below. The area should be dressed before being sown with a mixture of ⅜oz. of sulphate of ammonia and ⅓oz. of superphosphate per square yard. The best mixture of seed for sowing home lawns in New Zealand consists of 2 parts of New Zealand chewings fescue and 1 part of Government-certified browntop. It should be sown evenly at the rate of up to 1oz. per square yard. To ensure even sowing it is best to divide the seed into two lots and sow by traversing the lawn in two different directions. The surface should then be raked lightly to cover the seed. Sowing should not be done if the soil is so moist that it sticks to the boots when walked over. Bare patches in lawns may also be worked over and resown during March. On established lawns a quarterly dressing of fertiliser should be applied, consisting of 1oz. per square yard of a mixture of 3 parts of sulphate of ammonia and 2 parts of superphosphate. March is a little late to continue the use of hormone weedkillers on lawns, as they are less effective when the weeds are past their peak of growth for the season. Lawns treated earlier with hormones should be inspected and any weeds which were not destroyed removed.



Gladiolus corms with the husks removed. Corms are best stored with their outer skins still on, and these should not be removed until just before planting time.

Lift, divide, and replant clumps of *Iris susiana* (the mourning iris) and all early-flowering herbaceous plants, such as doronicums and polyanthus, if this work was not done in early summer after they had flowered. Polyanthus lined out in some other part of the garden may now be lifted and planted in the flower border for spring display.

Loam for use in making mixtures for seed sowing, pricking out, and potting during next spring should be dug and stacked to rot during winter. The ideal soil for this purpose is a fertile loam, neither too wet nor too sandy, selected from a paddock which has grown grass well for some years. Soils which have not been able to support a good crop of grass are not likely to be able to grow good pot plants. Poor loams can be improved by mixing with them about an eighth of their bulk of rotted animal manure as the stack is being built up.

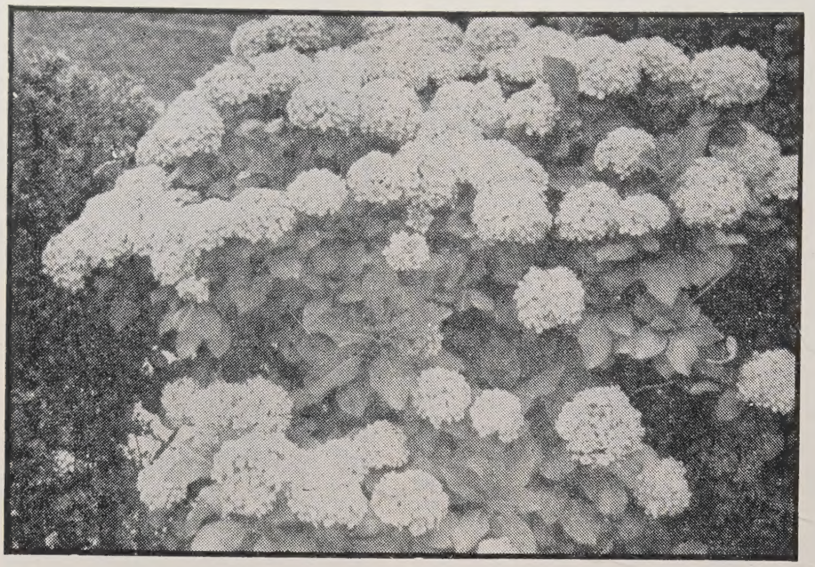
Plant out rooted cuttings from the propagating frame, polyanthus and primula seedlings raised in boxes, rooted layers of carnations, violets reproduced from runners, wallflowers, and Iceland poppies. The ground should be given a dressing of 3oz. of carbonate of lime before Iceland poppies are planted out.

Pot plants require a constant supply of moisture for continuous and good growth, but are easily killed by being over-watered. Correct use of water is probably the most important factor in successful growing of pot plants. There are two important conditions of soil moisture, field capacity and wilting point. Field capacity represents the state of the soil when it is holding its maximum amount of water without being waterlogged; this condition is attained when the soil has been flooded and then allowed to drain off all its surplus moisture, the water then remaining in the soil representing the maximum that that soil can hold. If such a soil is then allowed to dry gradually without further watering, there comes a point at which a plant living in the soil will droop and wilt because its roots can no longer draw enough moisture from it; the soil moisture is then said to have been reduced to wilting point. At this point the soil still contains some moisture, but insufficient to supply enough to replace normal transpiration losses. The soil moisture in a plant pot with a drainage hole cannot exceed field capacity unless the drainage hole has become blocked, and that should not occur if the pot is properly crocked and filled with soil. When drainage is impeded the soil tends to waterlog and most plants become unhealthy in it and some die. If water lies for more than a few moments on top of the soil of a pot after it has been watered, either the potting mixture is too heavy or the drainage is impeded. Even where drainage is perfect giving pot plants too much water serves no purpose, as the additional water tends only to remove in solution an excessive amount of the plant nutrients. The aim of watering should be to keep the soil in a condition between field capacity and wilting point, because plants grow equally well when the moisture content is anywhere between these two extremes; there is no evidence that plants thrive better at any one point than at another. Watering should always be done thoroughly, the pots being filled to the brim each time it is necessary. Putting a small quantity of water on top of the pot each day only gives rise to the condition where the top inch or so is moist but all the soil below that is thoroughly dried out. When a pot has accidentally become thoroughly dried out, the only really efficient way to wet the soil throughout is to submerge the pot in a bucket of water and leave it for about 10 minutes, then stand the pot to drain before putting it back in its position.

A hydrangea as a pot plant. All pot plants require careful attention to watering as described on this page.

Pot on cyclamens started into growth earlier in the year and a few rooted cuttings of balsams, fuchsias, and geraniums to make useful plants next year.

Roses are gross feeders and make heavy demands on food and moisture in the soil, and they grow to perfection only where their roots can reach a plentiful supply of these two materials. It is not generally considered a good plan to have other plants growing among the roses during summer when the bushes require all the available moisture in the soil, but low-growing plants, such as pansies and violas, which do not make great demands on the soil food and moisture, can be grown to good effect



[*Photo News Ltd. photo.*

Hydrangea bushes can be spoilt by hard pruning during winter.

around the edges of beds. Any suckers which appear growing from the base of a rose bush or below ground level usually arise from the stock on which the variety was originally budded and sometimes grow more vigorously than the bush itself. All such suckers should be removed at their bases.

Sow in boxes seed of antirrhinums, larkspur, scabious, East Lothian stock, schizanthus, and Russell lupins to provide early plants which will be ready to set out in beds and borders before winter to flower in spring. Sow sweet peas about 1½in. apart in boxes.

Sweet peas grow best in a site specially prepared for them. A trench 2 to 3ft. wide should be dug out, the topsoil being removed to a depth of 10in. and put to one side and the second 10in. of soil dug out and placed on the other side of the trench. A layer of compost is placed in the bottom of the trench, dug or forked in, and made firm by being trodden on. The second spit of soil is replaced and further organic matter mixed with it. The final spit of soil is dressed with complete fertiliser at the rate of 2oz. per square yard before being worked back into the trench, after which the whole area is dressed with 4oz. per square yard of carbonate of lime. Provided the soil is well drained, these preparations pave the way for an excellent crop of sweet peas.

Tulips of the Darwin varieties required for indoor display should be potted up during March. The pots should be stood in the coldest place available for 6 to 8 weeks for the plants to develop large root systems before the leaves start to grow. A dark cellar or shady place under evergreen trees is ideal. The pots should be watered only occasionally to prevent the soil from drying out, for the plants use little water at this stage of their growth. The pots may be stood in the open provided they are covered with a thick layer of soil or old ashes to keep them cool and prevent drying out.

Weeds are easily controlled during dry summer weather, when any weeds cut will soon wither and die. However, a new crop of weeds usually appears immediately the first autumn rains have thoroughly moistened the soil, the upper layers then being an ideal medium in which weed seeds can germinate. It is important that all cultivated areas be hoed thoroughly as soon as practicable after the first autumn rains.

Pests and Diseases

Thrips infest a wide range of ornamental plants and, though not native to New Zealand, are widespread in gardens in the Dominion. They are very small, active insects, with cigar-shaped bodies, yellow when young and black when adult. The adults have curious narrow wings fringed with hairs and they fly freely. Thrips scrape the surface of a plant and feed on the sap, leaving characteristic silver scurf on the foliage or flowers which they have attacked; this silver surface may go brown later. Thrips can be controlled by spraying with nicotine sulphate solution (1 fl. oz. of nicotine sulphate to 4 gallons of water plus 2oz. of soft soap). The spray is more effective if 1 per cent. of summer oil emulsion is added. A second application should always be made about 14 days after the first to destroy young thrips which have hatched from eggs not killed by the first spray.

Tomato spotted wilt virus frequently attacks nasturtiums, the leaves of which show yellow mottles and spots which may almost cover the surface, while the plants become stunted. As nasturtiums frequently over-winter in mild districts, they can carry the spotted wilt disease from one year to the next. All nasturtiums which show mottling or distortion of the leaves should be pulled out and burnt.

"Woolly bear" caterpillars are the black, hairy larvae often found eating holes in the leaves of cinerarias. The adult stage of this insect is the magpie moth, readily recognisable by its colouring of black with orange bands on its body and white spots on the wings. The caterpillars feed fully exposed on the leaves, so they can be controlled fairly easily by hand picking. A derris dust or 2 per cent. D.D.T. dust can also be used to control them.

Fruit Trifles with Mock Cream

THE ingredients for making fruit trifles are ½ packet of jelly crystals, 2 tablespoons of lemon squash, 4oz. of plain cake cut in small cubes, and a small bottle of fruit (preferably pears or apples).

Drain the juice from the bottle of fruit—the amount should not be much more than ¼ pint. Heat the juice and pour it over the jelly crystals, stirring until they are dissolved. Put a few of the cake cubes into each dish and over these pour the lemon squash diluted with water sufficient for the cubes to absorb. When the jelly is cold and on the point of setting pour a little into each dish and add a little of the bottled fruit. When the jellied trifles are set pipe the mock cream over the top. When nuts are available decorate with chopped nuts.

Mock cream: Put 1oz. of butter, 1 tablespoon of skimmed-milk powder, 1 tablespoon of milk, and a few drops of essence into a warmed basin. Beat well together with a fork, adjusting the amounts of milk powder and liquid milk, if necessary, to attain the desired consistency.

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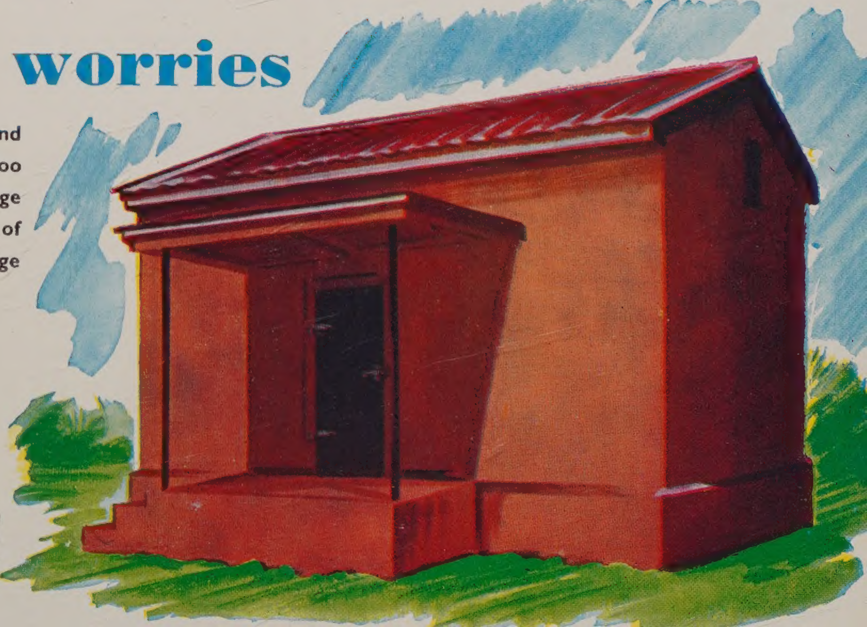

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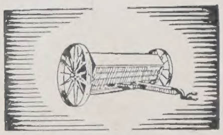

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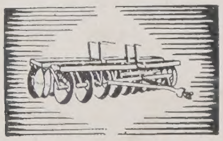

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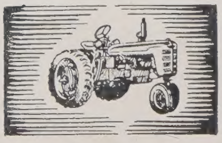

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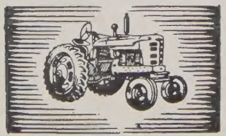

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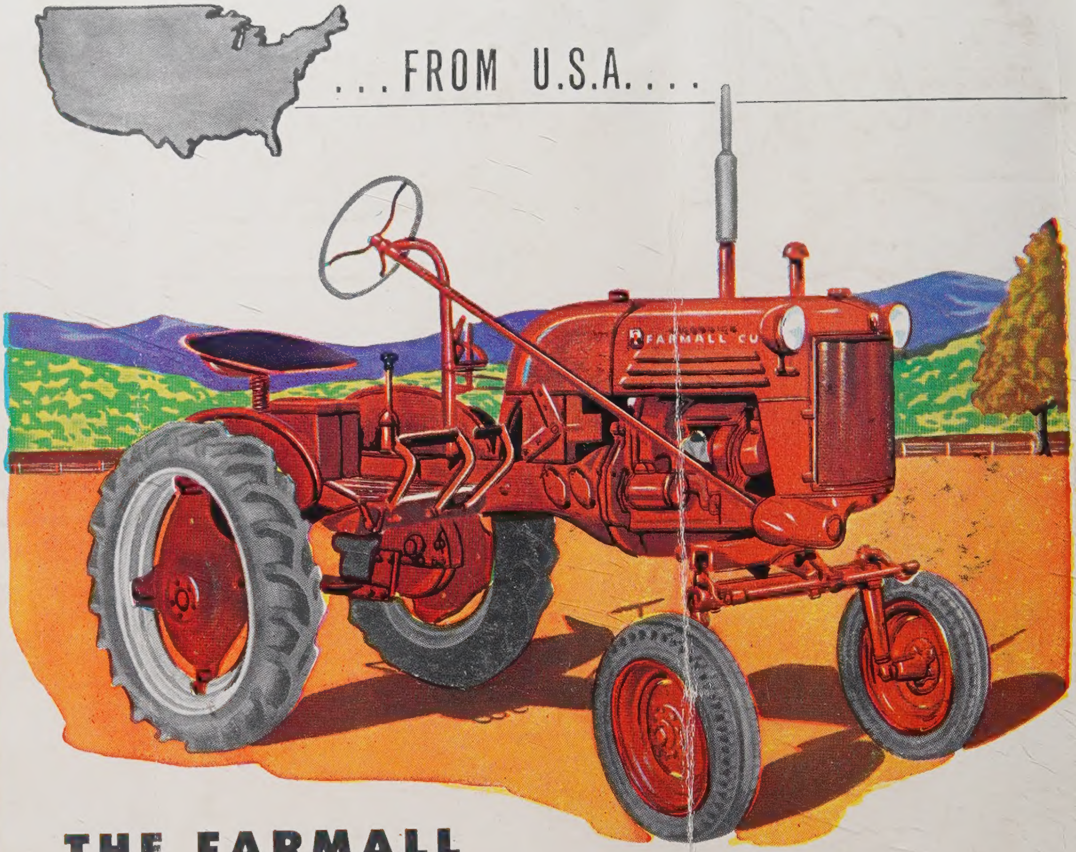

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